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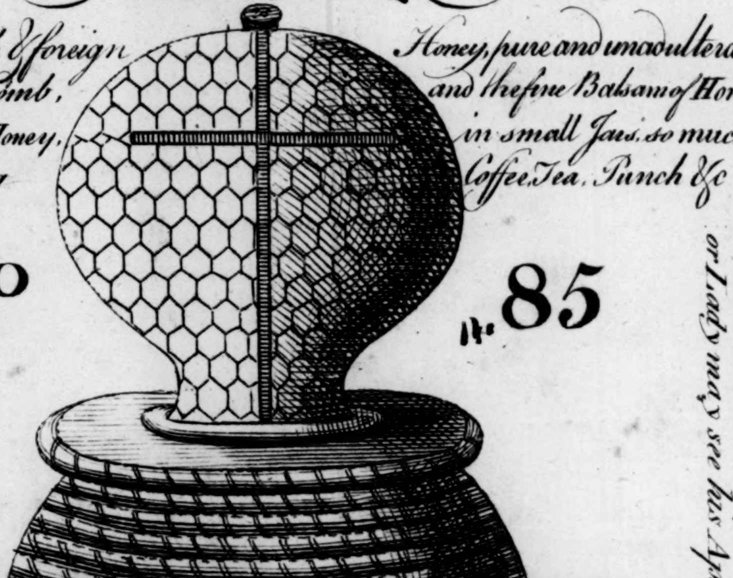
fine liquid Minorca Honey, in small Jars, so much
admired for sweetning Coffee, Tea, Punch &c



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The Drone. The Queen. The Honey Bee

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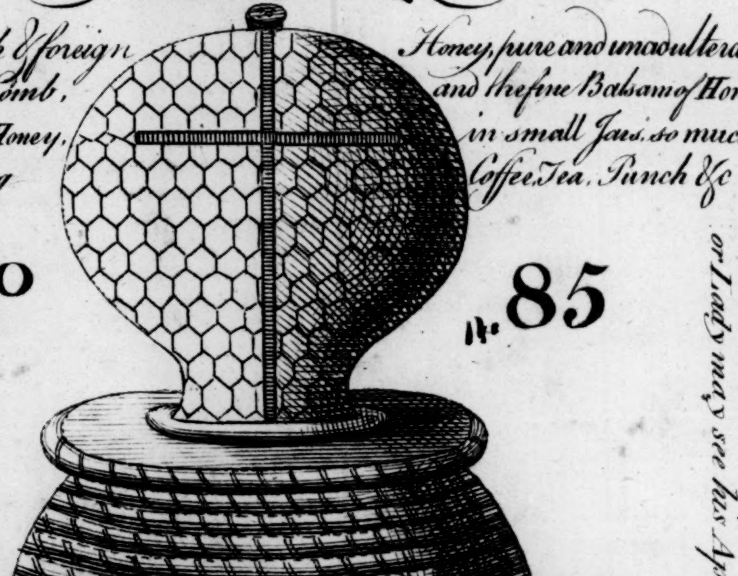

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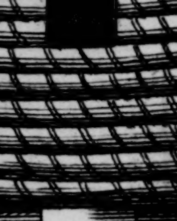

Just Publishd the second edition of the Management of Bees by N. Thorley

AN ENQUIRY INTO THE Nature, Order, and Government OF BEES,

Thoſe INSTRUCTIVE and USEFUL

INSECTS.

With a New, Eaſy, and Effectual METHOD to preſerve
them, not only in COLONIES, but common Hives.

A SECRET unknown to paſt Ages, and now publiſhed
For the BENEFIT of MANKIND.

Written upon
OBSERVATION and EXPERIENCE,
By the REVEREND
Mr. *JOHN THORLEY*, of OXON.

THE THIRD EDITION.

Illuſtrated with COPPER-PLATES.

LONDON:
Printed by J. JOHNSON, and Sold by N. THORLEY, at
No. 85. in *Lombard ſtreet*, near the *Manſion-houſe*.
M.DCC.LXXII.

TO THE

READER.

ARguments deduced from Nature and Scripture do demonſtrate the being and perfections of GOD, convince men of the natural and indiſpenſible obligation of moral duties, and perſuade them to religious practice; and if what is propoſed and urged in the following hiſtory of Bees, prove effectual for the preſervation of millions and myriads, of ſuch excellent, exemplary and uſeful creatures, the author's pains in the compoſure will be abundantly recompenſed.

It is not material, neither would it be of ſervice to tell the world, what led me at firſt into ſuch an acquaintance, (though very remarkable) with theſe little creatures, whoſe wonderful parts and properties are ſo many evident proofs of the infinite power and wiſdom of the Creator.

They have ever ſince been an agreeable amuſement to me, and the delightful employment of my leiſure hours.

But as I never was ambitious of being an author, I ſhould not have publiſhed theſe ſheets, were I not well ſatisfied that the public good would be promoted, and theſe profitable creatures preſerved to their owners, which are now annually deſtroyed, through want of knowledge in the management of them.

I have carefully peruſed ſeveral of our *Engliſh* writers of the greateſt eſteem, obviated many of their errors, and collected what I apprehended moſt material and uſeful in them.

Provided the reader will but diligently attend to, and purſue the directions given in the latter part of the book, for preſerving the lives of theſe delightful, profitable inſects, at the ſame time that he puts himſelf in full poſſeſſion of the treaſure they have with ſo much pains and labour gathered together, he will aſſuredly find, what the title page promiſes, in every particular perfectly accompliſhed, without the leaſt reaſon to complain of any abuſe or impoſition.

And would but the owners of Bees in *Great-Britain* and *Ireland* unanimouſly enter into the meaſures here recommended, a few years practice and experience would undoubtedly ſhew how much this way of management would promote, not only their own private advantage, but the riches of the kingdom ; and there would be leſs occaſion for ſuch large importations of honey and wax every year from other parts of the world.

But if neither private nor public intereſt, ſeparately or in combination, can influence and perſuade, I conclude it would be altogether ineffectual and vain to try other arguments.

That a deſign for the public good, the preſervation of theſe moſt valuable inſects, may be acceptable and ſucceſsful, not only through the

Britiſh dominions, but in all neighbouring kingdoms, and the moſt diſtant parts of the globe, is the earneſt wiſh, and the humble expectations and hope of

Your very faithful Friend,

And moſt humble Servant,

JOHN THORLEY.

Chipping Norton, in *Oxfordſhire*, *November* the 24th, 1743.

TO THE

PUBLIC.

THE Editor having for many years purſued the inſtructions of his father, (who is the Author of the following Hiſtory) hath made ſome improvements in the art and management of Bees; particularly a Glaſs-hive, as repreſented in the plate fronting the title-page, one of this conſtruction was filled with fine virgin-honey, and being an uſeful curioſity, was purchaſed by the Society for the encouragement of Arts, Manufactures and Commerce, who alſo purchaſed one of his colonies, that they might be inſpected by the curious, and brought into general uſe: perſuaded that the invention would prove of the greateſt advantage to this country, they offered a premium of two hundred pounds, in order to introduce Mr. *Thorley*'s, or ſome other method of a ſimilar kind, whereby much larger quantities of honey and wax might be procured, and at the ſame time the lives of theſe uſeful inſects preſerved.

Upon their general approbation of the method laid down in the following ſheets, and ſeeing the beauty and uſefulneſs of the invention of the Glaſs-hive, the Editor was honoured with the following letter from the Learned and Polite Dr. *Templeman*, Secretary to that reſpectable and uſeful Society, by order of the worthy members, who have been pleaſed to offer the following Premiums, to encourage the beſt method of preſerving the lives of Bees.

S I R,

SIR,

I have the pleaſure to return you the thanks of the ſociety for the lights and information with regard to the culture of Bees, which you have been ſo obliging to communicate to them.

PERMIT me at the ſame time, to ſend you my acknowledgments for the favour you did me, by putting it in my power to give a taſte of your honey to ſeveral of the members, who all agree that it was the beſt they ever taſted of *Engliſh* growth. I am, with the greateſt reſpect,

SIR,

Your moſt Obliged,

Humble Servant,

Strand, January
22, 1765.

PETER TEMPLEMAN.

A Premium of Five Pounds will be given to every perſon who ſhall have in his poſſeſſion, on *February* 1ſt. 1766, being his own property, any number of ſtocks of living Bees, in hives or boxes, not leſs than thirty; but in caſe there ſhould be above forty claimants, then the ſum of Two Hundred Pounds ſhall be diſtributed between the candidates, in proportion to the number of claimants.

A Premium of Five Pounds will be given to every perſon who ſhall take Ten Pounds of merchantable wax, from any number of ſtocks of living Bees, in hives or boxes, who ſhall preſerve their lives till the firſt of *March* 1767; but in caſe there ſhall be above forty claimants, then the ſum of Two Hundred Pounds ſhall be diſtributed between the candidates, in proportion to the number of claimants.

THE

HISTORY *of* BEES.

CHAP. I.

Of their Nature and Properties.

"NATURE, the largeſt, moſt learned, and perfect volume, every leaf in it ſhining with the fulleſt, cleareſt indications and diſplays of the divine perfections, affords all men matter of uſeful ſpeculation, and may be ſtudied with the utmoſt pleaſure, and greateſt advantage."——How entertaining and raviſhing a ſubject was this to the Royal Pſalmiſt? *How manifold are thy works, in wiſdom haſt thou made them all!* If things inanimate gave him ſuch an inexpreſſible pleaſure, how much more delightful muſt the contemplation be of creatures which have life! *A living dog* (ſays *Solomon*) *is better than a dead lion.*

And we find this great naturaliſt applying himſelf to the ſtudy of creatures very inconſiderable and contemptible, even ants, and other inſects.

Not only the nobleſt of ſubceleſtial beings, which occupy the higher poſts in creation, but alſo the minuteſt creatures, in their wonderful forms and ſtructures, various relations and references, mutual ſubſerviencies and dependencies, uſes, intentions and deſigns, are ſufficient to teach us; therefore demand our moſt diligent and ſerious attention.

As all theſe are the certain productions of Divine Power, ſo are they the conſtant care of Divine Providence.

It is not beneath, or unbecoming the Divine Majeſty, to take care of the creatures he has made.

If it be an honour to make theſe, why ſhould it be thought by any a diſgrace to take care of their ſafety and welfare?

It is impoſſible that any creature ſhould be independent, or ſubſiſt without a divine agency; therefore we muſt conclude the divine ſuperintendency entirely unconfined, and extending itſelf to the meaneſt inſect, as well as the greateſt monarch.

He who clothes the graſs, takes care alſo of oxen, feeds the ravens, and a ſparrow falls not to the ground without him. The eyes of all the living wait on him, who gives them their meat in due ſeaſon.

But how infinitely condeſcending and indulgent has he been to the human ſpecies, in appointing and providing ſo great a number and variety of inferior creatures, (beaſts, birds, fiſhes, *&c.*) not only for neceſſary uſes, but alſo for pleaſure and delight.

In this number the ſubjects of the following Hiſtory, in many reſpects ſerviceable to mankind, may very juſtly be included.

Their nature, and ſurpaſſing excellencies, are the ſubject of the preſent enquiry.

How mean ſoever they may appear to the major part of mankind, I hope to make it evident, to every attentive and ingenious reader, that they are in reality the moſt noble and excellent, moſt charming and valuable of all inſects.

As ſuch, they have for ſeveral ſucceſſive centuries employed many learned pens, both of philoſophers, phyſicians, divines, and others, though of very different ſentiments; who have favoured the world with their various remarks, and uſeful reflections; but in my humble opinion very defective in one point of great importance; ſince I find not any of theſe authors, (ancient or modern,) have given directions to the owners of theſe admirable inſects, how moſt effectually to preſerve the lives of ſuch profitable collectors, while they appropriate their treaſure to their own uſe.

Thus at once to deſpoil them of their riches, and ſacrifice their lives, is barbarous indeed!

*Dr. *Butler* mentions other things, beſides ſulphur, to lay Bees aſleep; yet not with any deſign to preſerve their lives, but only to poſſeſs their treaſure.

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* *Butler's Fæm. Monar.* p. 151.

It is no difficulty, by a proper opiate, to lay them in a deep ſleep, as will be ſhewn hereafter; but when that is effected, where, or how ſhall we diſpoſe of them, or provide for them a convenient and agreeable habitation, with ſufficient ſupply for their maintenance and defence till the next gathering ſeaſon?

For this the reader will find very full and particular directions towards the cloſe; by a diligent and careful obſervance of which, with a few trials and experiments, he will quickly commence *Maſter of the art*.

In that innumerable multitude, and ſurprizing variety of inſects in the world, made for the ſervice of man, Bees are moſt to be admired; there are none that can equal, much leſs excel them; as by their painful labours, and plenteous collections, they contribute and miniſter not only to the neceſſary ſupports, but alſo to the pleaſant and delightful accommodations of life.

I moſt willingly allow the Silk-worm in her manifold changes and tranſmigrations, to be a very wonderful creature, and, as ſuch, may paſs for a miracle in nature.

But let it be remembered, ſhe is of ſervice only in one particular, even providing raiment, and that not of equal neceſſity with the Bees productions.

The ſervice of theſe is much more extenſive, furniſhing us with more neceſſary things, *viz.* food and phyſic; one to ſupport nature, the other to heal its diſorders.

The Silk-worm accommodates us with cloathing for the body; but the Bees help both to nouriſh the body, and to heal it: the one is for ornament, beauty, and decency; the other for health and neceſſity.

Pliny inſiſts at large upon this argument, and proclaims their excellency in theſe words*: *Among all inſects Bees are the principal, and juſtly merit the greateſt admiration and regard.*—" As Bees ſerve for neceſſary uſes, to feed " the belly and heal the body, they deſerve to be loved " and defended of all.†"

But their nature and ſuperior excellencies will more fully appear from their following exemplary properties.

Of their Loyalty.

THEIR great Loyalty to their Sovereign, (being all under the government of one monarch) are perfectly ſurprizing and aſtoniſhing; without precedent or parallel, all royal orders and commands are moſt readily and fully executed, chearfully and conſtantly obeyed, whether in ſwarming, in killing the drones, or fighting with their enemies, *&c.* nor is there a ſingle rebel in all the community.

They are fond of the perſon of their Queen, whoſe preſence is abſolutely neceſſary to the proſperity and ſafety of the whole. Their Principal loſt, proves the certain and total deſtruction of the ſtate, except the owner ſupplies them in time with another governeſs.

Such is their affection and love, that, on every juſt and proper occaſion, they will freely offer, and unani-

mouſly

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[*] *Inter omnia inſecta principatus apibus, et jure præcipua admiratio.* Lib. 11. c. 5.

[†] Dr. *Butler's Fœm. Monar.*

mouſly determine, to ſacrifice their own lives in defence of their adored Sovereign's.

Without their head or chief they cannot reſt, be eaſy, or in quiet, though in the midſt of the greateſt affluence and plenty; but are ſo while with their Principal, even in the deepeſt, moſt diſtreſſing poverty, and will languiſh and die rather than depart from her.

In *June* 1715, paying a viſit to an honourable Lady in *Glouceſterſhire*, and taking a walk after dinner in the garden, ſhe told me one of her ſtocks had ſwarmed that day, and were hived; I examined the hive, and finding, as I expected, only a few Bees in it, I adviſed her to return them to their fellows, where they would be of more ſervice than if kept ſeparate and by themſelves. By her Ladyſhip's permiſſion I knocked one part of them down upon the graſs, and the remainder at a little diſtance from the firſt, taking that opportunity to ſeize the leader, which was eaſily effected. I carried the beautiful creature to the Lady, and other company then preſent. After a full view, they were all convinced this was the Sovereign. Having clipped the wings, I laid her down at a little diſtance from one of the ſquadrons, which were in perfect tumult and confuſion, running to and fro, and ſpreading themſelves about the graſs, ſearching for their loſt Sovereign.

When they found their leader, they gathered all together, greatly rejoicing.

I afterwards moved this Bee from place to place ſeveral times, till, by marches and countermarches, all the company ſaw theſe moſt loving, loyal creatures, would by no means forſake their Queen.

To prevent the ruin of the reſt I took her away, returning her no more; and after a fruitleſs ſearch for ſome time, they all fled back to the old hive; otherwiſe both the Sovereign and ſubjects would moſt certainly have periſhed together, as I have frequently obſerved in like caſes.

A young gentleman ſeeing the Bees crouding and cluſtering about their Queen, when returned, concluded ſhe was killed in the tumult, but was quickly convinced of his miſtake; for taking her from the multitude, he ſaw her as ſtrong and vigorous as ever.

In *September* 1743, a large parcel of Bees, having ſpent all their ſtore, entering into my grand Apiary, and attempting to force themſelves into one of my hives, and meeting with a moſt vigorous oppoſition, wherein conſiderable numbers were quickly ſlain, the reſidue ſettled under the pan and hackle, where they continued with the commandreſs ſeveral days, pining and periſhing together. Such inſtances are full proofs of their loyalty.

When their Sovereign is loſt, nothing is ſeen among them but tumult and confuſion, nothing heard but mourning and lamentation; whereon they either totally abandon the hive, yield to robbers, or leave the treaſure to the owners.—But in caſe the ſame is again found, how delightful is it to obſerve, with what tranſports of joy, and triumphant melody, ſhe is embraced and welcomed, and the whole empire is re-eſtabliſhed in perfect tranquility!

May they not be our inſtructors? Why ſhould death, in its moſt dreadful form, ever ſeparate the Chriſtian from his adored and moſt beloved Lord and Saviour? Should it not ſhame Chriſtians to be outdone and condemned by creatures, which have neither reaſon nor conſcience to conduct their actions.

Come likewiſe, Oh! all ye *Britons* and *Hibernians*, and learn your duty to your only rightful and lawful Sovereign KING *GEORGE*.

Theſe Inſects, then, never riſe in arms againſt their Sovereign.

Their Unity.

A BEE without her company is an inſignificant, impotent, helpleſs, uſeleſs creature; cannot work nor propagate her ſpecies, nor ſecure herſelf from numerous enemies and evils. But what noble, excellent purpoſes do they ſerve, thus incorporated, and by a ſocial ſpirit thus ſtrictly united together, jointly purſuing the public profit and advantage!

They are all one, not only in love and loyalty, but alſo in work and labour, mutually and alternately performing all manner of offices without diſtinction, as natural inſtinct teaches them; and in caſe of invaſions, they all join their forces in defence of their Sovereign, their dear offſpring, and treaſure.

Every ſtock of Bees, or colony then, may be conſidered in this view, as a commonwealth; their habitation is in common, food and proviſion in common, their labours all in common, their care of poſterity in common, and they ſympathize with one another in common danger, and with the greateſt courage and reſolution fight for one another.

By their united endeavours they produce that affluence and plenty that conſtitutes the riches of the whole ſociety, and of every individual.

Thus do they live in perfect peace and perpetual unity, to which the proſperity and ſafety of the ſtate is entirely owing; for civil wars, domeſtic quarrels and diviſions, would infallibly overturn, and entirely ſubvert the government.——Who knows not the fatal conſequences of diviſions, whether in families, cities, churches, or kingdoms?

If ſoul and body are once ſeparated, the man dies. If a city or houſe be divided againſt itſelf it comes to deſolation; and a kingdom divided againſt itſelf cannot ſtand.

Theſe little creatures, thus firmly knit together in ſincere affection, and combined in power, appear effectually ſecured from all aſſaults and enemies, excepting the fire and ſulphur of their cruel maſters.

How happy would it be for *Great Britain*, if all the ſubjects of KING *GEORGE* were as firmly united in fidelity and affection, and as true to one another!

Of their Courage.

THEIR valour and magnanimity is equal to their loyalty. I know no creatures that in reſolution and courage equal theſe. They are ſo bold, daring and intrepid, that nothing can intimidate them: not an army in martial order, with ſounding drums and trumpets, and roaring cannon, thoſe meſſengers of death. Once engaged they fear no enemies; they regard no perſon: nor will they ever yield, till diſabled or deſtroyed; they will conquer or die.

It is perfectly ſurprizing to ſee ſo much reſolution and courage in ſuch little, contemptible inſects. They have ſmall bodies, but great ſpirits, and great wrath. "Ex-
"aſperate them near their hives, in their buſieſt time of
"labour, and you may as well take a bear by the tooth,
"or offer to bind a lion with a ſingle thread or hair, as
"by reſiſtance and oppoſition to compoſe and quiet
"them."

Should any man queſtion the truth of this, he may quickly reſolve the doubt, and too late repent his fooliſh raſhneſs and preſumption.

About twenty years ago a friend of mine, at a neighbouring village in this pariſh, in the month of *June*, ſaw a ſwarm of Bees entering into an high aſh-tree, which was hollow, growing in the common field near his houſe; no perſon laying any claim, or pretending any right to them, he was deſirous to gain them for his own property.

When I underſtood their ſituation, and how they had poſſeſſed themſelves of ſo ſtrong an hold, and to all appearance impregnable, I repreſented to him not only the uncertainty and improbability of ſucceſs, but alſo the great hazard he would run in ſo deſperate an attempt, and that I would not be anſwerable for the conſequences.

He immediately prepared himſelf for the encounter, putting on his hands a very thick pair of mittens, (uſed in making fences,) and a cloth over his head, with a thin veil upon his face, having before collected a ſufficient quantity of nettles, as directed.

Every thing thus in readineſs for a ſtorm, I choſe a poſt at a convenient diſtance, and where I could be ſafe from the ſword of the enemy, determined to wait the event, and ſee to which ſide the event would fall.

He engaged on very great diſadvantages; the ſtrength of the caſtle, and the number of the garriſon many thouſands to one, and where every common ſoldier was a perfect hero, that would ſooner die than yield; yet thus did Mr. *Wiſeman.*

Up the ſcaling ladder goes my champion, very meanly armed, as before; and with a bruſh of nettles in his right hand, thruſts his arm up the cavity, ſwept them out at the paſſage, when immediately they were about his head as thick as hail, maintaining his poſt, till he had with the reſt of the nettles ſtopped the paſſage ſo cloſe that a Bee could not re-enter.

This done, down he came ſurrounded with the enemy, reſolved to revenge ſo great an injury, though with the loſs of their lives. They fell upon him with the greateſt fury imaginable, but I durſt not offer him any aſſiſtance or relief.

They charged him in flank, front, and rear; clung to him, like ivy to the tree; got under his covering, into his hair, and under his cloaths, and ſtung him from head to foot.

It was a conſiderable time before the battle was ended, and he had entirely diſengaged himſelf; at which time I ſuffered him to come to me, when hundreds of ſtings ſtuck in his hat, mittens, *&c.* beſides a conſiderable number left in his body, the poiſon of which preſently inflamed his blood, and threw him into a violent fever, which threatened his life. The fever increaſing, his life hung in ſuſpenſe for at leaſt two entire days; toward the cloſe of the third day it began to abate, and being a man of a ſtrong and vigorous conſtitution, he recovered, and in a few days more was perfectly well, to the great joy of his family, and other friends.

Some time after the battle, the ſcattered troops being re-aſſembled, roſe and ſettled upon a little branch of the tree, which I gently cut down, putting them into a hive prepared for them, when not ſo much as one ſingle Bee ſhewed the leaſt reſentment.

I was of opinion, that near one third was deſtroyed in the engagement; yet they gathered that Summer ſufficient to maintain them the following Winter, and for ſome years did well, though a very dear purchaſe.

The more you reſiſt, the more you enrage them, and when once provoked and engaged, they ſcorn to capitulate,

late, to enter into a treaty, or yield to a truce. The moſt prudent way is quietly to retire, in order to pacify them, and keep at a diſtance till the affront is forgotten.

The ſame courage and reſolution is ſeen in their mutual quarrels and wars, wherein they neither give nor take quarter, not ceaſing their conflicts till at leaſt one party is ſubdued.

Of their Induſtry.

IN painful, profitable labours, ſure no creature can be more conſtant and indefatigable, and no leſs chearful are they herein than conſtant. They have a natural inclination hereto, and nothing is more odious to them than ſloth and idleneſs. Labour is their very nature, and greateſt pleaſure : an hungry or a thirſty man doth not eat or drink with greater delight, than theſe admirable, amicable creatures, follow their appointed works, and proper employments. This is their beloved province ; and now they appear to be in their proper element. With the greateſt ſatisfaction and admiration have I frequently beheld them, moſt faithfully, and as chearfully diſcharging their ſeveral offices, without looſing the leaſt opportunity. Reſtraint at ſuch a ſeaſon would make them impatient, and confinement would be an intolerable puniſhment.

It is to theſe their united, moſt earneſt, conſtant labours, their proſperity and riches, are principally owing. *The diligent hand maketh rich.*

They are inceſſant, as well as abundant herein, deſiſt not, nor require a writ of eaſe, while ability laſts, and the ſeaſon permits and encourages, oftentimes venturing abroad with their wings rent and tort, in manifeſt hazard of their lives, and never return.

Though their labours are but of little more duration than ſix months in the year, yet they may juſtly be accounted the moſt induſtrious creatures upon earth ; the diſcontinuance of their labours for ſo long a ſeaſon being owing not to their natural temper, but only to their want of opportunity. They begin to work as early as the flowers appear, to furniſh them with ſuitable and neceſſary materials, and they deſiſt not till theſe ceaſe.

And in a honey-dew, in what a ſurprizing manner do they beſtir themſelves ! employing all the forces that can be ſpared abroad, when every Bee returns with its load, adding to the publick treaſure, with all poſſible diligence and earneſtneſs laying in ſufficient ſtore againſt a ſpending time they foreſee approaching. The Winter is long, their enemies are numerous, and many months they want meat, the utmoſt efforts are therefore neceſſary to prevent an univerſal ruin and deſtruction. They moſt earneſtly ſtrive ; it is for their life.

And if they are late ſwarms, and the weather alſo diſcouraging, (as the end of the laſt Summer) the greateſt diligence poſſible may be inſufficient to preſerve them. Scarce one in ten of the laſt year's ſwarms, which came late, could ſtand.

I have not above three left out of twenty-four. The continued and exceſſive rains, which damaged the corn, either waſted away the mellifluous juices, or prevented their gathering, or both, and ſo occaſioned the ſaid loſſes. Yet the Bees are in ſafety, united with other ſtocks.

Thus conſtant are they in their honeſt labours, from morning till night; and when the day is gone, their work is not done: they labour in the night, in building combs, (if they are new ſwarms) or in filling the magazines with honey, or ſealing the cells, miniſtring more nutritive matter to the young brood, killing the drones, *&c.*

In a word: ſuch is their natural temper and diſpoſition, that rather than be idle and inactive, they will be doing miſchief, *viz.* plundering and robbing their neighbours. To conclude; if ants are commended for their prudent pains, providing their meat in Summer, and gathering their food in harveſt, though unſerviceable to men; how much more worthy of praiſe are theſe inſtructive, exemplary inſects, who herein ſet us (both as men and Chriſtians) a pattern fit for our imitation? *Go then to the ant,* (or rather to the Bee,) *thou ſluggard,* and *learn wiſdom.*

My drowſy pow'rs, why ſleep ye ſo?
Awake my ſluggiſh ſoul!
Nothing has half thy work to do,
Yet nothing's half ſo dull.

The little Ants for one poor grain
Labour, and tug, and ſtrive;

Yet we, who have an heav'n t'obtain,
How negligent we live!

Good God! on what a ſlender thread
Hang everlaſting things!
Th' eternal ſtate of all the dead,
Upon life's feeble ſtrings.

Infinite joy, or endleſs woe,
Attends on every breath;
And yet how unconcern'd we go,
Upon the brink of death[*]*!*

The Ant has no guide to direct her what to do, no overſeer to obſerve whether it is done or no, nor ruler to puniſh her negligence and miſconduct; yet acts as if it were ſo. How doth this aggravate our ſloth and improvidence, who have a guide to ſhew us what is good, an inſpector of all our actions, and a Lord and Ruler to whom we are accountable! Shall we then be idle and inactive, and ſuffer ourſelves to be outdone by ſuch creatures as theſe? Would not that be both our ſin and ſhame?

In morning fair theſe lab'rers cut the ſky,
Thro' all the gardens and the meadows fly;
And free from envy, by their labours ſtrive,
Which ſhall contribute moſt t' enrich the hive.

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[*] Dr. *Watts's Hymns,* Lib. 2. H. 25. 55.

Such is th' employment of their happy days ;
And ſuch their title to immortal praiſe.

Dimſdale on Bees.

Their Innocency.

THEY are alſo naturally innocent, inoffenſive, and patient. In their foreign labours, gathering honey, or other materials diſtant from their hives, they are not eaſily provoked, but will bear perſonal injuries and affronts with wonderful patience. In their honeſt and lawful employments you may diſturb them, drive them from place to place, and from flower to flower, without any reſentment, and eſcaping by flight, they follow their work elſewhere, in ſome peaceable quarter ; but he that affronts them in their own dominions, and in their buſy times of gathering, will ſoon be ſenſible of their reſentment, that they are implacable and unmerciful ; and if he be a ſufferer, he may blame himſelf for his imprudence and preſumption.

In their own kingdom, and among themſelves, they are ſtrictly juſt ; not the leaſt injury or wrong done by any-one member to another : but they are not ſo to ſtrangers and foreigners ; to theſe they are moſt notoriouſly and inexcuſably unjuſt, robbing and plundering from others wherever they have power, and whenever they find an opportunity.

Their

Their Sobriety.

THOUGH they live in the greateſt plenty of the moſt delicious food, it cannot tempt them to the leaſt exceſs. What they have ſo painfully collected, and moſt carefully treaſured up, is ſparingly and prudently uſed, and with the greateſt moderation and frugality.

They do not prodigally waſte their precious ſubſtance in riot, revelling, drunkenneſs, and ſuch like ſenſualities, as the fool in the Goſpel, ſaying, *Soul, take thine eaſe, eat, drink, and be merry.* Language more becoming a brute than a man.

But though they have at all times free acceſs to this fulneſs, they never take more than a moderate repaſt. Eminent ſelf-denial! Never was one among them all ſeen diſguiſed or diſordered through their moſt beloved liquid.

Their Chaſtity.

THE next endearing excellency wherein they are examples to all, is their ſtrict and inviolable chaſtity. As they ſpend not their riches in riot and drunkenneſs, ſo neither in luſt and wantonneſs, or carnal concupiſcence. As to the manner of propagating their ſpecies, whatever paſſes among them of that nature, it is entirely hid from the eyes of all men, and the moſt ſtrict, diligent, and curious obſervers and inquiſitors have not been able to diſcover it. It is a ſecret, and will remain a myſtery. Dr.

Butler ſays they do not copulate as other living creatures do[*].

Come hither all you drunkards and debauchees, and from theſe learn to be chaſte and ſober. No more diſhonour your bodies; no longer degrade thoſe noble natures God has given you. Meaner ſouls than yours would ſerve well enough for thoſe baſe offices you commonly employ them in; to eat, drink, and play. Are you capable of converſing with angels, and the God of angels, and of enjoying him? place your ſouls no more with dogs of the flock.

Their Neatneſs.

ANOTHER virtue that ſhould not be paſt over in ſilence, being a pattern to all, eſpecially the female ſex, ladies, gentlewomen, and others; particularly thoſe whoſe province it is to diſcharge the offices of the kitchen, &c. is their cleanneſs and decency. They naturally abhor all that is filthy and impure, empty themſelves in flight, cleanſing their hives of all that is defiling and offenſive, carry forth their dead, and ſuffer nothing to remain that is in their power to remove, and in the leaſt diſagreeable[†].

They alſo live upon the fineſt food, the pureſt honey; as they extract it from the flowers, they depoſite it in their cells appointed for that purpoſe, without any debaſing mixtures or adulterations.

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[*] *Apes ſemine non coitu concipiunt.*

[†] *Mundiſſimum eſt omnium hoc animalium.*

And in their dreſs and perſonal appearance they are neat to a proverb. I write not this to countenance pride in any, but rather to recommend and encourage decent modeſt apparel in all.

When the tenants of the place, or rather the natives and rightful poſſeſſors, are diſinherited, either deſtroyed without mercy, or incorporated into another family, and you invert the hive, to view the noble fabric, and rich furniture, what an entertaining proſpect is there before you! nothing diſorderly or indecent to be ſeen; nothing but the greateſt regularity, purity, curioſity, elegance and beauty through the whole, moſt delightful to behold!

Sympathy, and mutual Aſſiſtance.

WE may moreover obſerve their ſympathy and mutual aſſiſtance. They moſt readily and chearfully embrace every opportunity of helping, and being ſerviceable to their fellow-ſubjects; as in invaſions from enemies, in killing the drones, burying their dead, and carrying away all that is prejudicial and provoking. When the labour or burthen is too much for a ſingle Bee, how oft may you behold a ſecond and a third joining their forces, one at one end, another at the other end, dragging the diſagreeable object out of their dominions.

Their Sagacity.

THEIR ſagacity and prudence are obſervable. (Prudence metaphorically underſtood.) They act by natural inſtinct, as tho' they were rational; not only providing in Summer their Winter ſtores, but alſo places of refuge and defence, to which they may retreat when night or ſtorms come, as rocks, hollow trees, *&c.* if their owners prevent them not by hives, as proper habitations.

He that gave them their being has empowered them to act with as much ſagacity, foreſight and conſiſtency, for their own welfare and ſecurity, as though they were rational creatures.

Their Vigilance and Watchfulneſs.

THOUGH they are ſuch excellent, exemplary, inſtructive, and profitable creatures, yet have they many enemies; therefore they are moſt watchful, keep a conſtant guard to prevent a ſurprize, examine all paſſengers, and are preſently in arms on the firſt motion, diſturbance, or alarm, their All being in danger. In their hives they are not always ſafe; therefore conſtantly upon their guard.

Are all theſe virtues thus viſible in theſe inſects that want reaſon; how much more ſhould they appear in men, and in Chriſtians? Do they hate treaſon and rebellion,

bellion, faction and diviſion, cowardice, idleneſs, injuſtice, intemperance, impurity, indecency, ſelfiſhneſs, improvidence, and ſecurity, why ſhould we practiſe them?

Let us learn the contrary virtues from theſe inſtructive inſects. But how many of the human ſpecies need to be ſent to ſchool to Ants and Bees, which better anſwer the end of their being!

Their Love and Unity.

SINCE infinite wiſdom ſends to us Ants and Bees for inſtruction, let us not diſdain, nor refuſe to learn from theſe inſects, as follows, *viz.*

Love, with loyalty and ſubmiſſion to our only rightful Sovereign KING *GEORGE*, and all lawful power. The Grand Seignior, with all his janiſſaries about him, is not half ſo abſolute as the Queen of Bees; yet ſuch is their innate loyalty, that they will, with the greateſt courage, fight to preſerve her in ſafety.

Again; Courage and reſolution in defence of our civil liberties and reformed religion. Will theſe little inſects, without reaſon, ſo freely venture their lives and eſtates in defence of their Sovereign? Let us then behave like genuine *Britons*, and Chriſtian heroes, in the cauſe of *Engliſh* liberty, truth, and true religion.

Alſo diligence and prudence; ſeaſonably providing againſt a ſpending time. Bees neither beg nor borrow, and ſpare no pains in Summer to lay in their Winter-ſtore. Herein they are patterns to us; let us follow their example.

As alſo in purity. They cannot diſpenſe with any thing filthy or unclean, but caſt forth whatever is defiling and offenſive. Let us learn to abhor and ſhun all that is polluting and impure. Heterogeneals will not incorporate; light and darkneſs are inconſiſtent. How can purity and pollution dwell together?

Unity likewiſe, with love and peace. No diviſions, contentions, or wars among themſelves, which ſhame us, conſidered either as fellow-ſubjects, or fellow-chriſtians.

Temperance and ſobriety in the enjoyment and uſe of our outward comforts. They are laborious to lay in plentiful proviſions, not for ſenſuality and exceſs, but only for neceſſary ſupport, the preſervation of health and life.

Again; patience and innocence. They are never injurious to any, except they are provoked; and at a diſtance from their hives, they will bear many indignities and affronts, without the leaſt reſentment.

May we ſtudy to be blameleſs where we may not be exemplary; bleſs thoſe who curſe us, and pray for thoſe who hate and perſecute us.

Moreover ſympathy and mutual aſſiſtance. They help one another moſt readily, both in their wars, and conſtant labours, which ſhould teach us brotherly kindneſs and charity.

Finally, conſtant watchfulneſs. Theſe inſects have many enemies; for which reaſon they never give themſelves up to ſecurity, but have their guards to watch the city, and prevent a ſurprize.

How many are the Chriſtian's enemies? King *David* compared his to Bees.[*] How great is the number of infernal ſpirits? that are very powerful, politick, malicious, cruel, diligent, and ever watchful. Let theſe alſo teach the Chriſtian ſoldier, conſtant watchfulneſs.[†]

Hannibal at the gates was enough to awaken the citizens of *Rome*, and call them to their arms.

The grand enemy (Satan at hand) ſhould call the chriſtian to his prayers, and keep him ever on his guard. Let us take *Solomon*'s advice.[‡]

[*] Pſal. cxviii. 12.

[†] *Fas eſt et ab Hoſte doceri.*

[‡] Prov. vi. 6, 7, 8.

CHAP. II.

Their OEconomy, or Form of Government.

AS the wiſdom of Providence, which demands our utmoſt attention and regard, is moſt obvious and viſible in innumerable other inſtances; ſo likewiſe in theſe little, yet moſt admirable inſects. They are a perfect monarchy, agreeable to the original plan: they cannot thrive, nor live, but in ſociety, and under a Sovereign. And what would be the fate of this univerſal empire, were it not for an infinitely wiſe and powerful ſuperintendency?

The ants may be conſidered as a democracy, or common-wealth, having no overſeer, or ruler; but in theſe inſects God hath ſhewed to men the expreſs pattern of a perfect monarchy; the moſt natural and abſolute form of government.*

Without a preſident, or ruler, they will do no manner of work: neither gather wax, nor honey, nor other materials; nor can they breed, and propagate their own kind, without ſuch a commander. If a ſtock, they would yield to robbers; or elſe languiſh and pine themſelves to death, and the whole ſociety moſt certainly periſh.

This

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* *Dr. Butler's Fœm. Monar.*

This proclaims the value of this royal inſect, far ſuperior to all the populace. Had you ten thouſand, or ten times ten thouſand of theſe common ſubjects, without a Sovereign, they would be but as ſo many cyphers without a figure, of no ſignificancy, worth, or ſervice.

Do but therefore ſupply a languiſhing ſtock as above, with a preſident or principal; do but provide them with a common parent, and it will prove as life to them from the dead; inſpire every breaſt with freſh courage and vigour. No ſooner is the news proclaimed in publick, but with ſurprize and pleaſure will you ſee the happy change; inexpreſſible joy reigning thro' the whole empire; all hands are immediately employed, and their future, chearful, faithful, and conſtant labours, will abundantly recompenſe your tender and compaſſionate regard, your generous aſſiſtance and relief, in their moſt ſorrowful and diſtreſſing circumſtances. And by this one kind act and office, you prevent the total deſtruction of many thouſands of theſe excellent creatures; nay, of an entire kingdom or empire. Delightful thought!

Here it muſt be obſerved, that this Regent aſcends not the throne as an uſurper; gains not the regal power and authority by conqueſt or force of arms; nor by acts of tyranny, injuſtice, oppreſſion and cruelty; nor again by election, (as ſome ſuppoſe) but by hereditary right; nature having entitled and advanced her to this ſovereign dominion, and imperial dignity. So that her claim is indiſputable and unalienable. *Butler* obſerves, that the

Queen comes to the ſupremacy by ſucceſſion, or a judicious, prudent election; alſo by birth-right and ſeniority. If that right be hereditary, why ſhould it not be conſtant and immutable?

As they cannot ſubſiſt, much leſs proſper, without a guide or ruler, ſo neither will they admit of ſeveral. A preſident or governour appears abſolutely neceſſary; and no more than one will be tolerated among them. A plurality of rulers would introduce that confuſion which would occaſion the certain and entire deſtruction of the whole ſtate, unleſs thoſe competitors and pretenders to the crown be preſently depoſed.

In all ſwarms united, wherein are more or fewer of the royal iſſue, all excepting one are ſlain and expelled. And in thoſe wars and conteſts, where the forces are near an equality, how fatal have I often found the conſequence. Such fixed battles I have ſometimes beheld, and that not for a few hours, but two or three days together; till one ſide has been entirely vanquiſhed and ſubdued, or both diſabled; and in ſhort ruined, and brought to deſolation. But, united under one Sovereign, they live in perfect peace. Whence it is plain beyond diſpute, this is their form of government, and this alone. A body without a head would be a monſter, and two heads to one body would be the ſame.

Here I muſt inſert a paſſage, which at firſt ſight ſeems to militate againſt the received opinion, and all the obſervations I have made of their form of government, as follows.

Towards the end of *March* 1743, walking at even-tide in my chief apiary, I obſerved at ſome diſtance from the mouth of one hive, (all the other ſtocks being within doors, and in perfect peace,) a ſmall cluſter of Bees in ſome commotion, which raiſed my curioſity to ſee what might be the occaſion, juſtly concluded it to be ſomething uncommon; going directly to the hive, immediately I diſcovered, among the croud, a royal corpſe carrying forth to burial. The number of the mourners attending the funeral did not amount to twenty; I took the dead body from among them, after which, in a little ſpace, they returned to the reſt of their company.

This being a circumſtance I had never met with before, I was in doubt for ſome time about the event. If we conclude aright as to their form of government, *viz.* a perfect monarchy, I apprehend this ſtock, having thus loſt their Sovereign, muſt of neceſſity miſcarry. On the other hand, obſerving no diſorder or confuſion among them, as is uſual on the loſs of the Governour, I was in hopes they might be ſafe; this hope daily increaſed, as by a ſtrict and frequent obſervation I found they continued quiet and in peace.

In about a week the weather proving more favourable, and inviting them to their moſt delightful labours, theſe with the other ſtocks, began again to work, to collect neceſſary materials, *&c.* by which I ſaw they were indeed ſafe, and my former fears altogether without foundation.

Here then a queſtion may ariſe, whether or no there were two Governours all the preceding winter in the ſaid hive; or this Bee, thus diſcarded or deſtroyed, of a late extraction.

The former, ſo directly contrary to the general opinion, obſervation, and conſtant daily experience, is not to be admitted; and ſuppoſing, yet not granting, it as matter of fact, I query, why this ſupernumerary ſhould be ſuffered ſo many months, even all the winter ſeaſon, and expelled only in ſpring.

It ſeems moſt reaſonable therefore, upon the whole, to conclude this Bee was born out of due time, produced, too early for the ſwarms, and for that reaſon thus depoſed. Upon which hypotheſis our fundamental principle remains firm and unſhaken. But ſhould the contrary appear, it would be but a ſingle exception from a general rule. Should any fuller evidence appear needful in what is now under our conſideration, I will only add, as follows, and with an air of certainty and aſſurance alſo, as final and concluſive, that in all the ſtocks I have for the ſpace of thirty years united, (particularly near fifty the laſt *October*) I never, on the ſtricteſt ſearch, found more than one Commander; which I think amounts to demonſtration.

Theſe inſects then, without controverſy, are governed by a ſingle Sovereign, as abſolute as the grand ſeignior himſelf.

Nor do the female troops of Thrace *obey*
With humbler care, their Queen's deſpotic ſway;
Than the ſubmiſſive Bees the royal mind
Moſt abſolute, yet always juſt and kind.

Diſtinctive honours in the regent ſhine,
To ſhew the virtues of the ſcepter'd line;
Superior goodneſs finds a juſt reward,
And public love is a perpetual guard.
But if by death to the elyſian ſhade,
The much-lamented royal gueſt's conveyed;
In ſtately pomp the honour'd body lies,
And all the city's fill'd with mournful cries.

Dinſdale on Bees.

CHAP.

CHAP. III.

The Deſcription, or Anatomy of the Bee.

I AM now entering upon a ſervice, to which I am unequal, and much unqualified for. So many and ſo great are the difficulties that attend enquiries of this kind, that a much abler hand, and more ingenious mind, is neceſſary to remove them, and place what comes here under conſideration in a clearer and fuller view.

After all our late improvements in natural philoſophy, there yet remains thoſe ſecrets in nature, that the moſt diligent, accurate ſearch, and painful diſquiſition, will not be ſufficient fully to diſcover.

In naturals, as well as ſpirituals, we ſhall know only in part. And after we have gone the utmoſt lengths poſſible, in ſuch enquiries, there will be ſome imperfection in our knowledge, during the preſent depreſſion of our nature.

Many uſeful obſervations have been made in theſe latter times, by the improvement of the microſcope; whereby a very great difference between things natural and artificial hath been made manifeſt.

There are ſuch and ſo great embelliſhments and curious inimitable embroideries in the ſmalleſt ſeeds of plants and flowers, but eſpecially in the ſeveral parts of animals, ſuch accurate elegant order, admirable beauty and ſymmetry in the frame and compoſition of the minuteſt creatures, as no man could conceive or credit without beholding them.

" More particularly thoſe in human bodies. The " conſideration of which induced *Galen* to acknowledge " a Deity.

" In his book *de formatione fœtus*, he obſerves more " than 600 ſeveral muſcles in a human body, and at " leaſt ten different intentions or due qualifications to be " obſerved in each of theſe. Proper figure, juſt magnitude, right diſpoſition of it's ſeveral ends, upper and " lower poſition of the whole, the inſertion of it's proper nerves, veins, and arteries, all which are to be " duly placed ; ſo that about the muſcles alone, no leſs " than 6000 ſeveral ends or aims are to be attended to. " The bones he reckons to be 284. The diſtinct ſcopes " or intentions in each of theſe, are above 40, in all " about 100,000. And it is the ſame in proportion " with the other parts, *viz.* the ſkin, ligaments, veſſels, " glandules and humours ; but more eſpecially with the " ſeveral members of the body, which do, in regard of " the great variety and multitude of the ſeveral intentions that are required in them, very much exceed the " homogeneous parts. And the failing in any one of theſe " would cauſe an irregularity in the body, which in many of them would be very notorious.

" And thus likewiſe it is in proportion with other " kinds of beings, minerals, vegetables ; but more eſ-

“ pecially the ſenſitive; as fiſhes, inſects, birds and “ beaſts.”

Were we able, even by the help of glaſſes, to take the fulleſt and moſt ſtrict ſurvey of this little animal, ſo full of wonders, could we by any means enter into it's inmoſt receſſes, view it's almoſt imperceptible parts, moſt commodiouſly adapted to their ſeveral offices, their excellent contrivance, admirable contexture, their elegance and beauty, the minute particles of which they are compoſed; together with all their ſecret ſprings of moſt regular, artful, beneficial motion, and the various uſes, ends and purpoſes they are appointed to ſubſerve, it would appear the moſt exquiſite piece of workmanſhip.

But as I pretend not to entertain the reader with an exact analyſis, or complete anatomy of the body of this inſect, I ſhall quit that province to ſome ſuperior genius, who more able to penetrate into theſe hidden and profound myſteries, may place them in a clearer and fuller light.

The great and bountiful Creator of the world has not been wanting to any, even the meaneſt of his creatures, having furniſhed them all with excellent capacities, and qualified them ſuitable to the ſtations he hath appointed for them; and wonderfully fitted them for all thoſe offices he intends to employ them in.

As a perfect inſight into the mechaniſm of theſe moſt admirable inſects is not abſolutely neceſſary to the due management, or a right and profitable improvement of them, it may be ſufficient to take notice only of their various inſtruments, organs, and utenſils, ſo well adapted to their reſpective offices and employments, neceſſary for their maintenance and defence; or their principal parts, which are very obvious to all obſervers, leaving the more minute and leſs viſible, (diſcerned only by the help of the microſcope) to the more curious and ſkilful anatomiſts, to place in a better light.

Deſcription of the Bee.

A Bee is an inſect,* and a flying inſect, conſiſting of three principal parts, *viz.* the head, the breaſt, and the belly; the firſt is the leaſt, and the laſt is the largeſt of the three.

In the head (which is of a triangular form) we are to conſider the external parts; the eyes, the mouth, or jaws, the tongue or trunk, and the horns.

Firſt, the eyes, which are of an oblong figure, black like jet, tranſparent and immoveable, covered and defended from all injuries, by an horny tunicle, not eaſily penetrated; therefore an effectual ſecurity to their ſight, which ſome writers tell us is their weakeſt ſenſe, tho' ſometimes I have found it quick enough to my ſorrow. The eyes ſerve as two cheeks, and ſupply their place on each ſide.

The ſecond is the mouth, or jaws, opening like the mouths of ſome fiſhes, to the right and left, ſerving, inſtead of hands, to carry out of the hives whatever offends, incumbers, or incommodes them.

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* *Ab inſecare.*

Here are their teeth, by which, in their wars and battles among themſelves, they kill one another, and not with their ſtings, as ſome aſſert, and others ſuppoſe. In the ſpace of forty years, I never ſaw one of theſe inſects fix it's ſting in another, excepting once.

Their chief ſtrength lies in their teeth, which are terrible inſtruments of revenge, and moſt fatal; for all that are thus bitten moſt ſurely die in a ſhort ſpace: you may frequently obſerve them with their wings diſabled, or their joints diſlocated, which they cannot long ſurvive; for their wounds are always mortal.

The third is their trunk or tongue, which by reaſon of its length, the mouth is incapable of containing; but is doubled under the throat down to the breaſt, divided into five branches, the outermoſt being as a caſe to the reſt.

It is pliant and flexible to the laſt degree, as well as taper; and of ſuch length, that the Bee may be the better enabled to probe and penetrate to the bottom of the flowers, and exhauſt all the diſperſed mellifluous juice for the publick ſervice.

From the ſpungy nature of this proboſcis, or polyglot, ſprings that power of ſuction, whereby they are enabled quickly to abſorb all thoſe delicious ſweets the flowers, *&c.* ſo plentifully afford them; which, as they are extracted from trees, plants, or flowers, are directly conveyed into the little bag or bladder, in the third and laſt diviſion, by means of two aqueducts, or little canals, which ſerve alſo as two ligaments, to join the principal parts together; afterwards the honey is conveyed back again thro' the ſame paſſages, and placed in the cells, or proper magazines, by the ſame inſtrument that collected it.

The parts that offer themſelves next to view are the autenns, or pair of horns, with two joints; the one cloſe to the head, the other near the middle, pliant and bending every way; or elſe compoſed (as they ſeem) of leſſer joints, not to be ſeen by the naked and unaſſiſted eye. Theſe are the principal inſtruments of feeling, eſpecially in the dark hive; and are placed betwixt the eyes, near the middle of the head, whoſe largeſt dimenſions 'is it's latitude, as will ſoon appear upon its ſeparation from the adjoining part, and yet is the ſeat of all theſe neceſſary and uſeful members, beſides the brain, beſt diſcovered by the microſcope.

The breaſt, or ſecond diviſion, is in form a ſpheroid, or cylinder, of larger extent than the former, but ſhorter than the latter, and in which are placed their wings and legs; one above, and the other beneath. Their wings are pellucid and ſhining, fixed two on the right, and two on the left; of a curious compoſure, not unlike cypreſs, and much reſembling the combs when firſt formed; yet ſtrengthened with many ribs, or fibres, running thro' the whole. By the help of theſe they tranſport themſelves at pleaſure from place to place with ſuch velocity, that in a few minutes they are a mile or more diſtant from their hives.

Theſe by conſtant labour are quickly wore out; and, when they appear rent and torn, are ſure ſigns of their approaching death. Theſe parts prepared for flight, are ſo firmly faſtened, by a ſtrong and knotty joint, that they are not eaſily ſeparated from the body; and of ſuch an extent, as to cover the greateſt part of the laſt diviſion.

Underneath the breaſt are the legs, ſix in number, three on the right, and three on the left, but in length unequal; the firſt pair next the head are the ſhorteſt, the middle pair ſomewhat longer than theſe, but ſhorter than the third and laſt.

They are all pliant, having many joints; the firſt ſerve equally for hands and feet, and ſo ſcabrous, rough and jagged, that they generally fix upon a leaf or flower at the firſt touch. And at the extremities of the paws, by the help of the microſcope, appear little hooks, whereby they faſten themſelves together, and cleave ſo cloſe to one another in their hives, and in ſwarms, that they are not without ſome difficulty ſeparated. "Their "legs and feet, wonderful in their ſtructure and contri-"vance, according to their different circumſtances and "neceſſities of life, afford a moſt delightful variety of "objects; particularly the ſharp-hooked claws, which "enable them to walk on graſs, and other ſmooth ſur-"faces; alſo a ſort of ſpunges, which preſerve their "claws ſtriking againſt hard bodies, by the ſoft fleſhy "protuberances at the bottom of their feet."

The inſide of the breaſt, conſiſting of a porous, fibrous, reddiſh fleſh, contains the heart and organs of reſpiration; beſt diſcovered by the help of glaſſes. A ſmall contuſion of this part, (including the vitals) occaſions death.

The third and laſt part is the belly; in which we obſerve ſix rings, ſliding one over another, reſembling the ſcales of fiſhes, which have a power to extend or contract themſelves as there is occaſion, by the help of proper muſcles nature has accommodated them with (tho' Mr. *Ruſden* could diſcover only three partitions, with ſilver coloured lines acroſs, p. 5. which at once ſhews how incurious he was in his remarks, and how remote from the truth in his report.) And within theſe plaits they fix and carry their wax; and not upon their legs or thighs, as the common people generally conclude, and moſt authors I have met with have ignorantly, yet very confidently, aſſerted.

But of that more hereafter. This is the largeſt oblong, and in ſome degree annular, taper, and piramidal. Within this laſt diviſion, or integral part, we find the bladder, or little bag, in which they carry both water and honey, conveyed thither at the time of gathering, thro' the narrow channels which traverſe the head and breaſt, and reconveyed to anſwer the ſeveral purpoſes for which they are ſo carefully and painfully provided. The bag of poiſon hath it's place here, near the root of the ſting.

Here likewiſe is the gut, which is only one ſingle entrail; and when left with the ſting, is certain death to the inſect. The extremity of this laſt part is the place of evacuation.

The laſt part to be examined, and the moſt curious of all, is the ſpear, which certainly hath a poliſh exceedingly fine, and is without diſpute a moſt exquiſite piece, and the point imperceptible.

This penetrating inſtrument is diſtinguiſhed, and commonly known by the name of the ſting, by which theſe inſects defend themſelves againſt men and beaſts, and offend their enemies. *

The author seems to have forgotten himself, for Page 45: he says it is with their teeth they of=fend. ——

It is of an horny conſiſtence, and hollow like a tube, near the extremity of which is an orifice, thro' which the inſect emits two darts, ſtrong and pungent, tho' inexpreſſibly fine.

But to give the reader a fuller deſcription of ſo curious an inſtrument, I readily accept the aſſiſtance of thoſe gentlemen who have, by the help of the microſcope, moſt ſtrictly examined it.

"It thus appears to conſiſt of three parts, *viz.* a "ſheath or ſcabbard, with two bearded darts, of an un- "equal length, which riſing obliquely, make the wound "the more painful, prevent the return, and render the "extraction the more difficult and troubleſome. The "ſheath terminates in a ſharp point, and near the ex- "tremity a paſſage opens, thro' which, at the time of "ſtinging, the two bearded darts are protruded beyond "the end of the ſheath; one of which being longer than "the other, fixes it's beard firſt, and the other inſtant- "ly following, they alternately ſtrike deeper and deeper "into the wound, by their hooks taking faſter hold of "the fleſh, when a poiſonous juice is injected thro' the "ſame (ſpicula) or ſheath, from a little bag at the root "of the ſting, which for a time occaſions an acute pain- "ful ſwelling."

Mr. *Derham*[*] tells us, that in the ſting of a waſp he counted no leſs than eight beards on the ſide of each dart,

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[*] *Derham's Phy. Theo. p.* 241.

* The author seems to have forgotten himself, for in Page 45: he says it is with their teeth they offend, (and fight their battles.) ——

dart, and Mr. *Baker* † has obſerved the ſame number in that of a Bee.

The muſcles of the ſheath are ſtrong, by which it eaſily enters the fleſh of man or beaſt.

From the whole it is plain, that what appears darting forth from the body of the Bee, is not properly the ſting, but only the ſheath wherein it is incloſed. And it is eaſy to tell when the inſect ſhoots forth this inſtrument, ('tho' neither ſeen nor felt) merely by the ſmell, which is not in the leaſt diſagreeable.

Frequently I have obſerved, when the inſect hath ſhot forth this part, with an intention of revenge, or in it's own neceſſary defence, at, or near it's extremity, a little drop of that poiſon, which upon the firſt puncture inſinuates itſelf into the wound. Whence it is not unreaſonable to conclude, this alone, piercing or penetrating the ſkin and fleſh, is ſufficient to inject the ſaid poiſon, without the aſſiſtance of the two darts; yet theſe may be inſtrumental in fixing it faſter in the fleſh; as I have oft beheld it, when tore off from the body of the Bee, working itſelf ſtill deeper into the wound.

Thus have we (tho' very imperfectly) viewed their principal parts; the ſeveral organs, or implements, nature has furniſhed them withal, for their ſubſiſtence and defence.

No leſs indulgent has nature been to them in regard to their dreſs; their very raiment, reſembling the fineſt velvet, bright and glittering; their whole bodies covered with the moſt curious hair, not unlike to the richeſt ſhagg, which greatly embelliſhes every part, more eſpecially

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† *Baker's Micr. p.* 210.

pecially the breaſt, and far excels what the greateſt maſter in that art can pretend to.

How infinitely then do the ſecret beauties of nature tranſcend and ſurpaſs thoſe of art; which curiouſly examined, charm every ingenious mind, filling it with an inexpreſſible delight and pleaſure!

What is all the pageantry, ſplendour and glory of an earthly court, to nature's ſimple dreſs and ſecret beauties, far more moving and entertaining!

If King *Solomon* in all his glory was not arrayed like a ſingle blade of graſs, or a flower, how much leſs like one of theſe curious inſects!

Examine the fineſt and moſt exquiſite performances of human art, and compare them with the productions of nature, and how exceeding great will the difference appear! and by how many degrees hath nature the preheminence!

" The ſting of a Bee, viewed thro' a microſcope,
" ſhows every where a poliſh, moſt amazingly beautiful,
" without the leaſt flaw, blemiſh, or inequality, ending
" in a point too fine to be diſcerned; yet this is only the
" caſe, or ſheath, of two other inſtruments much more
" exquiſite, contained therein.

" Dr. *Power* tells us, he ſaw a golden chain at *Tre-*
" *deſcant*'s, of 300 links, not more than an inch in
" length, faſtened to and pulled away by a flea.

" And Mr. *Baker* ſays, * he ſaw near *Durham-yard*
" in the *Strand*, (which he examined with his microſ-
" cope) a chaiſe, made by Mr. *Boverick*, a Watch-maker,

" with

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* *Baker's Microſ. p.* 295.

"with four wheels, and all the proper *Apparatus* belonging to them, turning eaſily on their axles; together "with a man ſitting in the chaiſe; all formed of ivory, "and drawn along by a flea, without any ſeeming difficulty: And weighing it with the greateſt care, found the "chaiſe, man, and flea, were barely equal to a ſingle grain.

"At the ſame time and place, he alſo weighed a "chain of braſs made by the ſame hand, about two inches long, containing 200 links, with an hook at one "end, and a padlock and key at the other, and found it "leſs than the third part of a grain.

"And ſince that (made by the ſame Artiſt) he ſaw a "quadrille-table, with a drawer in it, an eating-table, "ſide-board table, a looking-glaſs, twelve chairs, with "ſkeleton backs, two dozen of plates, ſix diſhes, a dozen "of knives, and as many forks, twelve ſpoons, two "ſalts, a frame and caſtors, together with a gentleman, "lady, and footman, all contained in a cherry-ſtone; "and not filling much more than half of it.

"He likewiſe mentions one *Oſwald Nerlinger*, who "made a cup of a pepper-corn, which held twelve hundred other little cups, all turned in ivory, each of them "being gilt on the edges, and ſtanding upon a foot, and "that ſo far from being crouded, or wanting room, the "pepper-corn could have held four hundred more.

"And then adds, theſe are ſome of the niceſt, moſt "curious and ſurprizing works of art, but let us examine "any of them with a good microſcope, and we ſhall be "immediately convinced, that the utmoſt power of art "is only a concealment of deformity, and impoſition

" upon our want of ſight; and that our admiration " thereof ariſes from our ignorance of what it really is.

" Thus (as he concludes) ſink the works of art, when " we are enabled to ſee what they really are. On the " contrary, the nearer we examine, the plainer we diſtinguiſh, and the more we can diſcover of the works " of nature, even in the leaſt and meaneſt of her productions, the more ſenſible we muſt be made, of the " wiſdom, power and greatneſs of their author.

" Apply the microſcope where we will, nothing is " found but beauty and perfection. View the numberleſs ſpecies of inſects around us; what proportion, exactneſs, uniformity and ſymmetry ſhall we perceive in " all their organs! What a profuſion of colouring! Azure, " green and vermillion; gold, ſilver, pearls, rubies and " diamonds; fringe and embroidery on their bodies, " wings, heads, and every other part! how rich the glow! " how high the finiſhing! and how inimitable the poliſh " we every where behold!

" It is the ſame in larger or leſſer animals; how amazingly curious muſt the internal ſtructure of theſe " creatures be! the heart, ſtomach, entrails and brain! " how minute and fine the bones, joints, muſcles and " tendons! how exquiſitely delicate, beyond all conception, the arteries, veins, and nerves! what multitudes " of veſſels and circulations muſt be contained within the " narrow compaſs! and yet all have ſufficient room to " perform their different offices and operations, without " impeding or interfering with one another.

" Thus we behold the moſt perfect works of art, be-

" traying a meanneſs, poverty and impotency in the a-" gent; but thoſe of nature plainly proving that the " hand that formed them, was abſolute maſter of the " materials it wrought upon, having tools exactly ſuit-" able to it's whole deſign. Every hair, feather or ſcale, " even of the meaneſt inſect, appears poliſhed and fi-" niſhed to the higheſt pitch; and ſhews the abundant " riches, munificence, and ſkill of it's maker.

The works of nature then as far ſurpaſs the moſt perfect works of art, as infinite wiſdom and power ſurpaſs what are merely finite. In all human operations, we ſee little but inequalities and deformities. The bounds of their abilities appearing therein; every part demonſtrating the Author's imperfection; but the works of the Creator are very way perfect.

The performance of the moſt perfect artiſt, ſet in competition with thoſe of the great Architect, are poor, mean, inelegant, incompleat, bungling in every part; and in the whole diſproportionate, irregular, and deformed.

The foregoing remarks, I have inſerted from Mr. *Baker*'s great improvement of the microſcope, in diſcovering the ſecret beauties of nature (ſo highly acceptable to the learned world) chiefly for the ſake of thoſe readers, who may want an opportunity to peruſe the original.

As to the ſeveral ſenſes, Bees ſeem to have them in very great perfection.

They are quick of ſight, tho' ſome apprehend a defect therein, obſerving them coming out of the hive, to wipe their eyes with their fore legs before their flight.

Their ſmelling is excellent; and by this ſenſe they preſently, in the dark hive, find out ſtrangers and robbers, as well as drones.

Their hearing and feeling are the ſame. The lighteſt touch of the hive, *&c.* they preſently perceive, witneſs the noiſe within, and their appearance at the door.

They as quickly diſtinguiſh taſtes, wherein they are exceeding curious. And their internal ſenſes, or qualities, are far more excellent, as obſerved before.

What creatures do we find more full of wonders, or expreſſing greater excellencies? not to be met with in beings of much larger bulk.

How curious their form and compoſition? ſuch a variety of parts, number of joints, and their connections, ſo regularly and moſt admirably diſpoſed, in ſo ſmall a fabrick? "All which, beſides what lyes out of ſight, do "abundantly demonſtrate, and evidently prove the infi-"nite wiſdom and power of the great Creator; which "we ought to acknowledge and admire in the meaneſt "inſect, and moſt contemptible animal; in an ant, as "much as in an elephant.

"Theſe inſects may juſtly plead equality with the "greateſt beings upon earth, and boaſt with the beſt "among them, the proudeſt monarch and moſt glorious "below, ſaying, (*Eſt Deus in nobis*) here behold the "power of God, the preſence of Deity!

"And it may be queried whether the Divine Provi-"dence, in its moſt ſublime and myſterious operations, "calls more for our wonders, than in the contrivance, "policy, *&c.* imparted to theſe little creatures, or little "ſocieties of Bees.

CHAP.

CHAP. IV.

Their Sorts, Sex, and Manner of Breeding.

THOUGH (without controverſy) all the Bees in a ſwarm, hive or colony, are of the ſame ſpecies or kind; yet, in their external form and compoſition, in the ſeveral poſts or provinces they occupy and act in, the offices they ſeparately diſcharge, together with the ends and uſes they are appointed to ſerve, there is a very great and manifeſt diverſity among them; for which reaſon we place them in three diſtinct claſſes, *viz.* the Sovereign or Regent, the common honey Bees, or working part of the nation, and the Drones: no other order among them can be admitted.

Dr. *Butler* tells us,* that beſides the Sovereign, the Bees have alſo ſubordinate leaders and governours, fitly reſembling captains and colonels of ſoldiers, diſtinguiſhed by particular marks, as if there were degrees of dignity among them; but in all other reſpects like the vulgar.

It appears, *Pliny* led him into this miſtake. †Mr. *Ruſden* after the Doctor has diſtinguiſhed them into four parts, *viz.* king, captains, commons and drones; but in his following deſcription takes no further notice of the ſecond rank. [‡]

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* *Butler's Fœm. Monar. p.* 6. † *Pliny*, L. 11. c. 5. 17. *Rempublicam habent, Conſilia, ac Duces circa Regem Satellites.*

From forty years diligent obſervation and experience, I have not learned any ſuch difference, as theſe two gentlemen have inſinuated; nor in reality is there any ſuch diſtinction among them. Both the phyſician and apothecary have herein impoſed upon their readers.

Tho' the Doctor was no doubt the beſt, and the moſt judicious writer, of his time, upon this ſubject; yet from many other inſtances, beſides what I have mentioned, we find them fallible, and much miſtaken; aſſerting many things as matters of fact, which are only mere conjectures.

Some things moreover he writes, not ſuited to vulgar minds; as in others he ſeems too prolix and voluminous. Yet take his monarchy together, and in all it's parts, it muſt be owned an excellence performance, eſpecially in that age of the world.

The Sovereign, or Queen-Bee deſcribed.

THIS ſtately, beautiful, moſt noble and glorious inſect, in ſo many things expreſſing royal majeſty, has been for a great number of years my grand favourite. A Princeſs I greatly admire; very highly value and eſteem, and as juſtly prefer before the many thouſands of her ſubjects.

The reaſons determining me to give her (in this hiſtory) the title of Queen, rather than King, in oppoſition not only to the ancient, but alſo ſome modern writers, the readers will find, in the ſection immediately following.

[‡] *Ruſden's Diſcov. p.* 2, 3.

The management of Bees to the greateſt advantage, particularly their preſervation in hives, at the time of union, depending ſo much on an ability to diſcover and ſeparate this Sovereign from ſuch a multitude of ſubjects, it is neceſſary that I decypher and paint her in ſuch plain characters, or diſcriminating peculiarities, that every Bee-maſter may the better know her, and more readily diſtinguiſh her from all the reſt, and take her from among the croud into cloſe cuſtody.

Thus the poor Queen becomes a priſoner, and is deprived of all her people and her liberty together. But till the owner is enabled by the following marks and characteriſticks, or his own obſervation, thus to diſtinguiſh her from the populace, I would not adviſe him to attempt an incorporation, which would be attended with ſome ill conſequences.

The Sovereign may be known from all her ſubjects by the following criterions, or marks of diſtinction, *viz.* by her bulk and ſtature; by her ſhape or figure; or by her colour and complexion.

1. By her bulk and magnitude; being much larger than the commons, and longer than the drones, and her ſeveral parts in juſt proportion; though ſome authors ſay her wings are ſhorter; and others, that they are of the ſame ſize with the commons; they do indeed appear ſhort, which is owing to the extent of the laſt diviſion, yet, upon the moſt accurate and ſtrict examination, it appears that thoſe authors were miſtaken, her wings ex-

ceeding in length thoſe of the commons; and ſhe flies with as much celerity, ſtrength and vigour, as they do. It is the ſame as to her ſpear or ſting.

Mr. *Purchas* tells us her ſting is little, not half the length of a common Bee.[*] Mr. *Ruſden* affirms it is not ſo large, nor ſo long as the ſting of a common Bee;[†] after *Pliny's Pennæ breviores*. But both thoſe gentlemen were miſtaken; her ſting in reality being longer than others.

Others are of opinion ſhe has no ſting at all,[‡] becauſe they never ſaw it. And for the ſame reaſon there are men in the world, who ſay there is neither God nor devil, angels or ſpirits.

It is very true that this ſword is wore by the Sovereign, rather for ſtate, than ſervice, having ſeldom obſerved the royal inſect to put it forth, tho' highly provoked thereto. In *October*, 1743, I made the experiment upon ſeveral, and found every one of them determined rather to loſe her deareſt life, than uſe the ſword in her own defence, ſo contrary to the principle of ſelf-preſervation implanted in nature.

Her tongue is ſhorter than that of the Honey-Bees; nature having deſign'd them only for foreign labours, but not the Queen, who is to live, as do other ſovereign princes, that are maintained and protected by their ſubjects.

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[*] *Pur.* pag. 28.

[†] *Ruſd.* pag. 4.

[‡] *Apum Regina ſtimulo caret. The Bees yield obedience to her unarmed Sovereignty.* Memorable to this Purpoſe was the Practice of a certain King of *France*, who entering a conquered City, expreſſed his Clemency by this Symbol, *viz.* a Coat full of Images and Pictures of Bees, with this Motto upon it, *Rex Mucrone caret. The King does not wear, neither does he uſe his Sting. Purchas.*

Mr. *Ruſden* alſo affirms, that ſeveral of theſe princes have at firſt a ſpot upon their foreheads, not unlike a diadem; which he very probably took, as well as other things, from *Pliny*[*]. But of all the numbers I have viewed and examined, for the ſpace of ſo many years (including 30 or 40 the laſt ſeaſon) I could never obſerve any ſuch ſtar. Mr. *Purchas* ſays the ſame, and is poſitive there is no ſuch ſpot. And yet (pag. 31.) tells us, he hath ſeen Bees with creſts, or taſſels upon their heads of different colours; which muſt be nothing more than adventitious or accidental.

Again, the Sovereign may be eaſily diſtinguiſhed from all her ſubjects by her form and ſhape; being larger and longer than the labouring Bees, eſpecially in her hinder part, which is by far more taper than all the other, terminating in a much ſharper point; nature having given her this peculiar form, in order the more readily to reach the bottom of the cells, where the eggs are depoſited for the propagation of the ſpecies.

Finally, by her colour alſo ſhe may be diſcovered, and by this I have more frequently found her, than by any other marks of diſtinction. Her upper parts are little, if at all, different from the Honey-Bees, but her belly and legs are or a very deep yellow, much reſembling the pureſt and the richeſt gold.

When the Bees of a ſingle ſtock are dropped into an empty hive (as hereafter directed) to be united with thoſe of another ſtock, the Queen generally falls one of the laſt, with her belly upwards, which preſently preſents her to the eye of a diligent and curious obſerver.

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[*] *Plin.* L. 11. c. 16. *In fronte macula quodam Diademate Aculeo præditus ſtimulo armatus.*——Candicans.

The populous, which are the laborious and moſt numerous part of this body politick, are the ſecond ſort or claſs. Theſe with ſome are accounted the males; but the more prevailing opinion is, that they are females; tho' in truth they are of neither ſex. But having already given ſo particular and full account of this corps, there is no occaſion to add any thing further upon this head.

The Drones compoſe the third and laſt claſs, which are about one third larger and longer than the other. The head is round; the eyes full, and form the greateſt part of the face; the tongue is ſhort, and the belly differs from the other two, being broader and much more obtuſe; of a darker colour than the reſt, and thicker cloathed: their voice likewiſe louder, and in flight making a much greater noiſe, whereby it is eaſy to diſtinguiſh them from all the reſt; and to ſay when they travel abroad, and when they return, tho' unſeen. At their firſt appearance I have often heard the ſound, before I have diſcerned the inſect.

They are alſo eaſily conquered, expelled, and ſlain by the commons, having no ſting by which to defend themſelves againſt theſe imperious dames.*

Theſe is urged by the philoſopher as an argument againſt the agency of the Drones in generation; who ſays, it agrees not with reaſon, that the Bees ſhould be females,

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* Though the Males generally maſter the Females, yet here the Females have the Preheminence. *Purc.*

males and the Drones males; becauſe nature never gives females weapons to defend themſelves withal, but the Drones are without weapons, having no ſtings, and are abſolutely under the dominion of the females. And that they ſhould procreate by generation is as improbable, no man ever having ſeen it.

The Drones then are natives, not ſtrangers or foreigners, and bred in the hive, as are the other two; but in cells purpoſely prepared for them, by the commons, and more ſpacious than the other cells, in which the Honey-Bees are bred.

"Now, as ſome ſuppoſe, ſuch indolent members "would never be ſuffered in a ſtate ſo remarkable for "conduct and œconomy, if they were not appointed "and reſerved for ſome ſervice or other.*" I proceed next to enquire, what is their peculiar province or employment.

Of their Sex, &c.

VARIOUS are the opinions of learned authors, as to their ſex, and manner of procreation; and they are greatly divided in their ſentiments.

It has been a controverſy in all paſt ages of the world, and is diſputed in the preſent age, whether in ſtrictneſs they are male or female; or conſiſt of both, and propagate their ſpecies, as do other inſects, by copulation: and if ſo, which is the male, and which the female.

And ſo many difficulties occur in enquiries of this nature,

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* *Nat. Delin.*

ture, that in all probability, and as far as I am able to judge, the full deciſion hereof muſt be left to future time, and the generations which are to follow.

Which is the male, whether the Drone, the Sovereign, or the common Honey-Bee, is the ſubject of our preſent enquiry. Some diſpute with zeal for the Drones, ſome for the royal Sovereign, and others for the Commons.

Ancient writers in general, philoſophers, hiſtorians, poets, and phyſicians, together with ſeveral modern ones, *viz. Butler*, *Purchas*, *Warder*, *Bradley*, and others, plead for the Drones. Dr. *Warder*, in his true *Amazons*, or *Monarchy of Bees*,* affirms the ruler to be a female, as alſo the common Bees, and that the Drone is the only male.

As to the ſex of the laſt there are many arguments, he ſays, for what he aſſerts, as that all creatures breed male and female; and he being the biggeſt, it is moſt probable that he is of the male kind: yet in the next period confeſſes, that it's being in ſubjection to the other Bees, is an argument againſt him.

But to put the matter into a clear light, any perſon opening the belly of the Drone-Bee, he ſhall find, in the ſame manner as in birds, a large pair of teſticles, as big as great pins-heads, milk-white, joined together upwards by the ſpermatick veſſel.——The penis, or inſtrument of generation, is indeed much more ſtrange, and will ſeem incredible to the reader, till he hath tried the experiment.—And in my opinion will appear the ſame after ſuch experiment.

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* *Warder's true Amazons, p.* 6, 7, 8.

Yet he adds, that the ſtrangeneſs of it's form and magnitude at firſt did not a little ſurprize him, as well it might.

It is in colour of a reddiſh white, and in ſhape much reſembling the head of a bullock with it's horns.—— But to ſay all that will be uſeful to the Male-Bees or Drones, they are abſolutely neceſſary to the breeding of Bees; haſtening them by their heat, and keeping the eggs warm: therefore it is better to kill ſix working Bees than one of theſe in *May*, or the beginning of *June*. So far the Doctor.

Mr. *Bradley** ſays, the conformity there is between the inward parts of common Bees and Drones is ſuch, that we have not been able to diſcern any difference between them; only the parts ſituated at the extremity of the belly are very different from thoſe of the Bee.

The Bees have a little bladder which contains the poiſon, diſcharged by the ſting thro' which it paſſes; but the Drones have neither ſting nor bladder; yet have they ſome other parts, which may lead us to underſtand the end for which nature hath deſigned them.

He obſerves four glandulous cylindrical bodies under the inteſtines; and inſerts a large account of ſix or ſeven pages, not much to the profit or edification of many of his readers.

Then adds (pag. 256.) tho' it is difficult for us to know exactly the uſe of theſe parts, yet may we ſay with ſome probability, that they appear to have been formed for propagation.

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* *Bradley's Husbandry*, &c.

And as we are confident that the King, who may be eaſily diſtinguiſhed from the Drones by his ſize and colour, is a female, we may ſay that the Drones are males. Upon which ſuppoſition, the cylindrical bodies mentioned before, may ſerve for teſticles, *i. e.* two little ones, and two larger for ſeminal veſſels, where the ſeminal ſubſtance is brought to perfection; but I have not been able hitherto to diſcover in what manner the impregnation is brought about.

He afterwards adds, from ſome obſervations made at different times, it hath been conjectured, that Drones contribute nothing at all to the generation of Bees.

How inconſiſtent is this writer with himſelf, confidently affirming the Drones to be the males, provided with four teſticles (inſtead of two) for perpetuating the ſpecies, and yet contribute nothing to generation?

But a greater blunder than this, (which the attentive reader cannot but obſerve,) he is guilty of, in ſaying the King is a female, *q. d.* the king is a Queen, or the male is a female; or that the ſame individual Bee is of both ſexes, male and female. Groſs notorious abſurdity, and an abſolute impoſſibility! not to be forgiven in a profeſſor of one of our learned and famous univerſities, and a fellow of the royal ſociety.*

But the profeſſor is not alone, I find others alſo erring herein; particularly Mr. *Purchas*, who not only aſſerts the ſovereign or governour to be a Queen; but alſo that ſhe injects a ſpermatic ſubſtance, thick like

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* *Bradley's Treatiſe of Huſbandry*, &c. *and Profeſſor of Botany.* Vol. i. pag. 251.

cream, into the orbicular cells, where the Queen-Bee is bred perfect at firſt in all her parts.[*] What! doth the very ſame inſect diſcharge the different offices of King and Queen! perform the work both of male and female! and at once lay eggs, and inject ſperm? how can this be? what occaſion would there be for Drones, upon ſuch a ſuppoſition, and of what uſe could they be in the hives?

How do theſe gentlemen at once contradict themſelves, and confeſs (in effect) their ignorance herein; not knowing whether the Sovereign is male or female; and ſhould be dignified and diſtinguiſhed by the title of King according to the ancients, or of Queen according to the moderns.

Dr. *Butler* declares this Bee ſo neceſſary, that he cannot be ſpared, and the Bees without him cannot breed.[†]

And tho' he is not ſeen to engender with the Honey-Bees either abroad, as do other inſects, or within the hive, yet without doubt he is the male Bee; by whoſe natural heat, and maſculine virtue, the Honey-Bees ſecretly conceive.

For which he urges the ſame reaſon with the authors before-mentioned, *viz.* That upon a curious diſſection of the Drone, there appears two large and white teſticles, lawful witneſſes of his maſculine ſex.[‡]

This is contradicted by the philoſopher, who ſays, nature hath not armed the female for fight and force againſt the male; but the Bees are armed with weapons, and power to chaſtiſe the Drones which have no weapons;

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[*] *Purchas's Theatre of Political flying Inſects*, &c. p. 29, 34. [†] *Butler's Fœm. Monar.* chap. iv. p. 55.

[‡] *Duos amplos et candidos teſtes.* *But.* p. 60.

pons; and therefore the Bees cannot be the females, and the Drones the males.*

The Drones are not ſtrangers, or foreigners, but natives, and one of the three eſtates of the kingdom, (as above) and bred in a comb and cells, more ſpacious than the reſt, prepared on purpoſe for them. What then is their peculiar province? are they the Queen's royal conſorts?† as ſome conjecture that their principal employment is to furniſh the Queen with a numerous progeny, or people the ſtate with ſubjects.

By the anatomy of the Drone ſome naturaliſts have imagined, that they were the authors of generation. Yet that author obſerves, that on the utmoſt endeavours to find out, by prying with all attention imaginable, what character theſe Drones maintained in the ſtate; all the obſervation he could make was this, that the Queen keeps herſelf retired in the upper chambers of the combs, and ſeldom makes her public appearance.

The learned greatly differ in their ſentiments about theſe myſterious inſects. Some late writers, as *Butler*, *Purchas*, *Warder*, affirms, the Drones are the males; and the only males; and tho' they are not ſeen to engender with the Honey-Bees, yet without doubt they are the Male-Bees.

Other authors, eſpecially the ancients, with ſome of the moderns are as poſitive, that the governing Bees are the males.

Thus ſome conclude they preſerve and propagate their ſpecies by copulation; which others queſtion, and ſome poſitively

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* *Generat.* Lib. 3. c. 10.

† *Nat. Delin.* Dial. 6. p. 89.

poſitively deny; and if we admit that the governing Bee is of the male kind, then it is moſt evident and certain that they breed without copulation. Since it is that Bee alone which diſpoſits in the ſeveral matrixes, or cells, that prolific ſubſtance or matter, which after a few days quickens; appears firſt a little worm, and at laſt a perfect Bee.

The Philoſopher[*] ſays, it is improbable, that ſome Bees ſhould be males, and ſome females: but herein he agrees not with the generally received and prevailing opinion, that the numerous ſpecies of beings were at firſt formed male and female; and inſects, like all other animals, are firſt produced by way of generation, and gradually come to maturity, whereby the ſpecies is preſerved.

“ Therefore every inſect owes it's being to a male and
“ female, proceeds from an egg the product of both ſexes,
“ wherein the ſeed and firſt nutriment is encloſed. And
“ theſe eggs thus produced are the foundation of a very
“ numerous offspring.

“ God at firſt created one man and one woman, from
“ whom all the race of mankind are deſcended: he like-
“ wiſe created one lyon and one lyoneſs, from whom
“ all beaſts of that denomination have proceeded; and
“ it is equally evident, that every inſect in the ſame
“ manner hath multiplied it's ſpecies.[†]

In ſo great a diverſity of opinions, and a caſe ſo dubious and diſputable, I will not poſitively determine either way; but humbly offer my reaſons why I cannot fall in with the ſentiments of many of theſe authors; and leave the diligent and ingenious reader to judge for himſelf, and adhere to what he apprehends approaches neareſt to the truth.

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[*] *Ariſt.*

[†] *Nat. Delin.*

Several writers are publick advocates for the Drones, aſcribing to them a principal power and agency in the work of generation; contending for them as the fathers of the family, the parents of ſo large a progeny.

There are objections againſt this opinion; and ſome of them of ſuch weight, that I cannot give into their way of thinking.

Firſt, becauſe it appears to me an aſſertion without proof, a principle which wants ſufficient evidence for it's ſupport; all that theſe gentlemen have been able hitherto to advance in it's vindication and defence, amounting to no more than probable conjecture, and ſtrong preſumption.

Thus have they left us much in the dark, and at the greateſt uncertainty, freely and unanimouſly confeſſing that no man ever yet ſaw any ſuch thing as copulation among them. Which is the argument *Ariſtotle* urges againſt this method of procreation.

In the dark hives indeed it muſt be exceeding difficult, if not impoſſible, to make any ſuch diſcoveries; but it ſeems ſomewhat ſtrange and unaccountable (provided this is the way of generation) that for ſo many ſucceſſive ages, no perſon by the moſt conſtant, diligent, ſtrict and curious obſervation, ſhould be able at any time to diſcern it, eſpecially ſince the invention of tranſparent boxes, or glaſs hives, which give us the favourable opportunity of viewing them at all ſeaſons, not only when the boxes are full of Bees, but when almoſt deſtitute.

But it is nothing new, when we are pinched with an argument, and drove upon the horns, to have recourſe to occult qualities, and occult operations; plain profeſſions of our ignorance.

Again; if this principle be admitted, and we allow the Drones to be the authors of ſo prodigious an increaſe, why have not theſe writers, who are counſel for the Drones, and ſo zealouſly plead their cauſe, dignified and diſtinguiſhed them with proper titles and appellations? if they are fully perſuaded in their own minds, anſwerable to this their open publick profeſſion, why have they treated them ſo long thus unkindly and injuriouſly, withholden thoſe titles of honour from them, to which their character, the poſts they occupy, and the noble offices they diſcharge, do ſo juſtly and indiſputably entitle them?

Why muſt the female be crown'd with honour and regal dignities, and all the enſigns of royalty; when at the ſame time the males are degraded, treated with the utmoſt contempt, triumphed over, and trampled upon by the populace and commonality; expelled and baniſhed; and, in a word, ſlain without mercy?

How could an empire or a kingdom poſſibly ſubſiſt, in which there were (ſuppoſe) ten or twenty pretenders to the crown, all claiming the royal authority? in ſuch caſe it would be no difficulty to foretel the ſtate of ſuch a kingdom.

I therefore leave the readers to judge whether theſe authors, aware of this abſurdity, and apprehenſive of the unhappy conſequences, did not out of deſign wave that title; or for ſome other reaſon. But to proceed.

May we not alſo argue againſt this notion from the prodigious number of Drones? if one ſingle Bee, (ſuppoſe a female) be ſufficient to produce ten or twelve thouſand in one ſummer, what occaſion can there be, or neceſſity, for many hundreds, nay ſome times thouſands (as in ſtrong ſtocks or colonies to my knowledge) to copulate with one female; reaſon and common ſenſe will tell us a much leſs number muſt be ſufficient and effectual for ſuch a purpoſe. Why ſhould ſuch numbers of theſe be produced for the ſake of one Queen, when few would be ſufficient.

We find it ſo among the fowls, which we obſerve in pairs; one male, and one female; and among the beaſts of the field, we frequently ſee one male impowered to ſerve an entire herd or flock; why may it not be the ſame among inſects?

I very well remember the *Croydon* phyſician quarrels with king *Charles*'s Bee-maſter for making a bull of his king.* Thus he writes; a Bee is firſt an egg, and not as Mr. *Ruſden* ignorantly ſuppoſes, made of animable matter (where he greatly miſtakes the apothecary, and wrongs him,) gathered by the Bees from flowers, and caſt into the combs as their proper matrix; then he makes a King-Bee, and preſently makes a town-bull of his king, going from cell to cell, and caſting his ſeed in-

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* Dr. *Warder*, p. 10.

to every cell. The attentive reader will, no doubt, put a remark hereon; a town bull, and yet nothing of engendering or copulating with any female whatever, Queen or common Bee; and I leave him to put what cenſure he thinks proper upon the Doctor, who treats his Queen as bad or worſe, publickly proclaiming her a common proſtitute; a baſe, notorious, impudent ſtrumpet; the moſt hateful and abominable whore, with gallants by hundreds.

Thus has he unawares highly injured her honour, attacked her in the moſt tender and affecting part; robbed her of the moſt precious poſſeſſion next to her life; ruined her character; and ſtripped her of one of the brighteſt jewels in all her crown; indiſcreetly expoſed his Queen to publick contempt and ſcorn, and ſhewn her no mercy. For if this be admitted as a truth, what is become of her ſo much boaſted, admired chaſtity, wherein ſhe appears ſuch an eminent pattern to the human ſpecies. I think therefore, upon the whole, it cannot be at all unreaſonable to conclude, that ſuch numbers of Drones muſt be produced for ſome other purpoſe, and have ſome other office or employment aſſigned them; being no way neceſſary for the work of generation.

But to enter into the merits of the cauſe, and bring the debate to an iſſue, I add as follows: it is matter of fact, and known to all who have any acquaintance with theſe inſects, that they not only begin to breed early in the ſpring, (ſometimes in the middle of *January*, or elſe in *February*, &c.) but alſo proceed therein ſeveral entire months; and conſiderable numbers, or many broods are continually compleated, before one of theſe ſuppoſed males are to be ſeen among them.

Theſe Drones make no appearance, nor do they exiſt till the hives are near filled with Bees, and the ſwarms in great forwardneſs; but are expected in a ſhort time after theſe are ſeen.

It is too evident to be contradicted or diſputed, that the Drones are all expelled, and ſlain at the cloſe of the preceding ſummer; the latter end of *July*, or in *Auguſt*, if the ſovereign is in ſafety. Hence it follows, there can be no Drones in the hives for at leaſt eight or nine months together. This is true in fact, as I have always found at the time of union, when not one Drone is to be ſeen.

A modern author then was greatly miſtaken,* when he tells his reader that a ſmall number of theſe are left, a few of them reſerved, to ſupply the neceſſities of the enſuing year. Which circumſtance, ſays he, I the rather take notice of, becauſe the Queen is pregnant again in the ſpring, tho' the Drones that are amongſt them are very little, if any larger than the common Bees. Another of his numerous errors!

Then he tells you in the ſame page, the poor Drones are expoſed to the wide world; and their circumſtances are doubtleſs very deplorable. In all probability they aſſociate with the wild Bees. A wild notion!

In ſhort, it is a difficult matter to ſay juſtly what becomes of them. Why ſuch a difficulty? when every common Bee-maſter can eaſily account for it; great numbers of them being ſlain, and often appear in heaps, before the hive or colony; and the reſt of them forced out by the commons periſh without doors, as is eaſy to obſerve in or about your apiary, and adjacent parts.

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* *Nat. Delin.* p. 90.

How defective this author's acquaintance was with our inſects appears by theſe inſtances, beſides many more. To return to the argument.

That theſe inſects ſhould continue in a ſtate of pregnancy for ſo many months, and then produce young, and ſeveral broods ſucceſſively, one after another, and this without the preſence or concurrence of the male, is to me (I profeſs) a myſtery, unaccountable, and unintelligible; not to ſay impoſſible. Since ſo many generations are bred before the Drones do appear, it is not poſſible they ſhould be either males or females.

That ſuch an impoſſibility may more fully appear, and ſo give the argument the greater ſtrength and force, I remark, that to my own certain knowledge, the Bees ſometimes breed all the ſummer ſeaſon without Drones. Several poor and weak ſtocks, which have but few Bees, and but little honey, have not any Drones among them all the ſeaſon; and yet theſe ſhall encreaſe, proſper, and breed Drones the following ſummer.

This is what I have many times obſerved, know it by my own experience to be true in fact, and as ſuch I publiſh it to the world, and for proof, I will give my readers only one inſtance inſtead of a multitude.

Once I had a ſtock of Bees, which not only bred great numbers all the ſpring-time, but alſo ſwarmed without any Drones, as I was fully aſſured from the moſt ſtrict and conſtant obſervation. Had there been one ſingle Drone in it, my eye or ear would certainly have diſcovered him.

The old ſtock continued to proſper, as before; and in about a month or ſix weeks after the ſwarm, ſome Drones (tho' few comparatively) appeared it it.

The new ſtock (or ſwarm) increaſed in numbers all that ſummer; but had no Drones among them till the following ſpring.

It is abundantly evident from hence, this ſtock of Bees had no Drones among them for the ſpace of ten or eleven months.

And I add further, that I have oft-times known weak ſtocks, that have not bred Drones for the ſpace of about two years.

From the premiſes may we not very juſtly draw this concluſion, that Drones are not the males, neither have they any inſtrumentality or agency in the generation of Bees. It hence appears abſolutely impoſſible.

And if this point is yielded us, then I am moſt fully perſuaded that they do not breed by copulation; the common Bees being neither males nor females. Were hive or colonies ever ſo well repleniſhed with both theſe ſorts, they would not be able to produce one ſingle Bee without the principal or Sovereign. Without the Queen they cannot breed.

It is well known that one ſingle female-waſp, without the aſſiſtance of the male, is ſufficient to produce a whole neſt of eight or ten thouſand in one ſummer. Why might not the Queen-Bee effect the like, had nature furniſhed her with proper tools or inſtruments for erecting the cells, and providing food for the young? but both theſe ſervices are aſſigned to the commons, whoſe property and peculiar province it is to prepare the matrixes, and collect and adminiſter fit matter for the nutrition and growth of the worm, or fœtus, till it comes to perfection, and is able to take care of itſelf, and then the moſt diligent and tender nurſes are fully diſcharged from their office.

It is moſt certain that the prolifick ſubſtance or matter which is depoſited in the cells prepared and appointed for procreation, and which after a few days quickens, and appears a little worm or maggot, proceeds from the Queen-Bee alone.

The queſtion then, in order to decide the long diſpute, *viz.* whether this Bee is male or female, is whether the ſaid matter, thus placed in the ſeveral matrixes, is (in nature) ſperm, or an egg.

I will briefly propoſe the reaſons which have induced me to embrace the latter opinion againſt the ancients, and ſome moderns, and conclude this Bee to be a female, and the only female; *viz.* that manifeſt and conſtant identity, which is very obvious both in the dimenſions and form of it; together with it's different parts, or compoſition.

The identity, or perpetual equality of it's ſeveral dimenſions. Examine theſe moſt ſtrictly, and compare them together as oft as you will, and no inequalities in their bulk and magnitude can be diſcerned, no alteration or difference among them; they always appear the very ſame.

Again, its invariable form, (an oblong figure) may be a further evidence. The moſt diligent and curious attention will not be able to find out any the leaſt alteration or difference here. The two ends are more protuberant than the middle, which is more ſlender, and this is the form of it in the belly of the inſect, and even after it is depoſited in the cells for ſeveral days, till the time it quickens, and appears a perfect worm.

And thus we find it in the eggs of other inſects and animals, which are remarkable for their proportions, different figures, colours, regularities, exact poſitions, *&c.* particularly the ſilk-worm.

If then neither of theſe can be ſafely affirmed, or fully proved, of the ſperm in man or beaſt, that there never is any difference, either in the quantity or the figure, then it muſt be admitted that it is nothing but an egg, and conſequently that this creature is of the female kind.

But I add, as a further evidence in the caſe, and what is more fully convincing, it's different parts, which compoſe the whole, and are eaſily ſeparated and diſtinguiſhed from each other, as I have often proved, placing the inſect upon my hand or an handkerchief, ſhe has (moving upon it) laid ſeveral of theſe oblong ſubſtances, and to all appearance as full of ſpirit and vigour as at firſt.

I have immediately examined theſe, which ſtill keep their form, while you gently move them up and down; but no ſooner have I by the help of a needle penetrated the ſame, but the whole moſt plainly appeared, even to the naked eye, to be a fluid, or liquid matter, contained in a thin ſkin or membrane; and without any the leaſt difficulty ſeparated the one from the other. Tho' Mr.

Ruſden ſays it is not an egg, but ſperm, and hath no ſkin to keep it in it's form, as the eggs of ſilk-worms.[*] But how can we imagine this to be any other than an egg; no ſperm being encloſed in a ſhell or membrane, as this is? whence it will naturally follow this is a female. Mr. *Bradley* ſays it is an egg, formed by a thin, white, and ſmooth membrane.[†]

From the aforeſaid remarks, I have taken the liberty to dignify this inſect above the reſt, and to diſtinguiſh her by the name of Queen, anſwerable to the title-page.

Yet after all that hath been offered upon this head, it ſeems to be a moot point, that will admit of a further debate. As I cannot attain to a full ſatisfaction herein myſelf, how can I expect the arguments ſhould adminiſter the ſame to the reader, whom I muſt leave to his own judgment and choice. Nor will I quarrel with any perſon, though he may perhaps apprehend ſome reaſons for not embracing my opinion.

Thus are we humbled thro' our own ignorance. Here we ſee how our intellectual powers are confined and limited; not an inſect, a pile of graſs, a ſingle hair, or an atom, but is enough to puzzle the ſkill and wiſdom of the greateſt philoſopher.

And thus has God puniſhed our pride and preſumption in aſpiring to be as Gods, knowing both good and evil.

Since then there are ſuch ſecrets and myſteries in the kingdom of nature, as alſo of providence, why may there not be the ſame in the kingdom of the Redeemer?[‡] or why ſhould theſe be any objection againſt the chriſtian religion, ſo fully atteſted by it's divine author, and confirmed by ſo great a number of inconteſtible miracles, which were his credentials, the evidences of his divine miſſion, that he really came from God, and was no impoſtor or deceiver? one remark more relating to the Drones ſhall cloſe this ſection.

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[*] *Ruſd.* pag. 45. [†] *Bradley*, p. 233.

[‡] 1 Tim. iii. 16 μεγα ἐϛι τὸ τῆς ἐυσεϐείας μυϛήριον.

If theſe inſects (whether males or females) miniſter nothing towards the multiplication of the ſpecies; if we allow them not to be the fathers of the family, the parents of ſo large a progeny: of what uſe or ſervice are they in the ſtate? as nature doth nothing in vain, it is but reaſonable to ſuppoſe they have ſome peculiar province, or office appointed for them.

In anſwer to which many, who have treated on this ſubject, tell us, they are, by their numbers and bulk together, greatly helpful in hatching up and haſtening the young brood.

But this is not without objections. Hitherto I never could obſerve any material ſervice done to hives or colonies by their means.

It is certain, that ſeveral ſets or broods of young Bees are perfected, and engaged in the uſeful and common labours, before any of theſe appear in the hive, or have an exiſtence; no Drones being produced till the latter end of *April*, or till *May*; many times not before *June*, or *July*; nor all that ſummer in poor and weak ſtocks.

And it is a very frequent and common obſervation, and experimentally known, not to a few, that conſiderable numbers are hatched, and the hives well replenished with common Bees, and ready to ſend forth new colonies or ſwarms, before theſe are in being. How then is this poſſible ? I wiſh theſe wiſe and penetrating gentlemen had better inſtructed us, and let us into the profound myſtery, and told us how, or by what ſecret and cunning art they contributed ſo abundantly towards the lives of others, ſo many months before they had received any of their own. At that time, and all that time they were mere nullity, non-entities, and had no power of acting.* How highly, how infinitely obliging to the world, had but theſe miracle-mongers communicated their *Noſtrum* to others, laying ſo great a myſtery open to mankind, which now muſt remain juſt as it was.

Again I object, it is as univerſally known, that the Drones are entirely expelled the end of *July*, or the following month, and yet the Bees continue their breeding thro' *Auguſt*, *September*, and part of *October*, if the ſeaſon is encouraging.

In one hive, which I took at *Michaelmas-day* laſt, I found conſiderable numbers of young brood in ſeveral combs in different degrees of perfection (tho' all of them cloſe ſealed up;) ſome maggots, ſome nymphs, and others perfect in all their parts, ready to make their publick appearance, or actually diſcharging themſelves from the diſagreeable confinement.

Beſides, it ought to be here remarked, that even thoſe ſtocks, which have no Drones among them, breed their young (proportionably to their numbers) with equal expedition and diſpatch, with thoſe which are full of Drones, as I am able to atteſt from my own perſonal and multiplied experiences ; which methinks tends not a little to diminiſh their nutrimental influences.

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* *Ex nihilo nihil fit. Quod non eſt non operat.*

Nor ſhould it be forgot, or overlooked, that ſeveral weeks before their total expulſion, they gather together in a diſtinct body by themſelves, ſeparate from all the reſt ; as tho' they entered a moſt ſolemn proteſt againſt all future converſation with their ancient friends and allies. This have I frequently ſeen towards the end of the ſeaſon at the back-window of the boxes ; and others may do the ſame.

Let the reader then inform me, what manner of influence they can have in the hive, in order to accelerate, or haſten the brood ; or whether any at all.

I will enlarge no further upon this article, ſo ſubject to contention and debate. "Vox et praeterea nihil."

The Method of Generation more particularly conſidered.

AS the preceding ſection is not only copious, but alſo preparatory to this, there will be the leſs occaſion to dwell here ; therefore I ſhall in brief repreſent the proceſs hereof, as it appears to me thro' the whole ſeaſon.

Bees begin to work and breed earlier or later in the ſpring, according as the ſeaſon is more or leſs encouraging : according as the flowers appear upon the earth, and the weather will ſuffer them to go abroad.

In a very warm and early ſpring I have found them at their foreign labours about the middle of *January* ; at other times in *February* ; but in a very cold and late ſpring not before the end of *March*, as after the ſevere froſt in the year 1740.

The fulleſt and richeſt ſtocks generally begin firſt. And tho' they begin in *January*, they continue their brood till the honey-gathering is paſt, tho' it were to the end of *Auguſt* or *September*.

The phyſician then muſt have been miſtaken,* when he told the world, that the ſooner they begin the ſooner they make an end; for it is not the length of time, or the number of months, but the plenty, penury, and want of materials to employ them, and work upon, that determines their labours. To my knowledge Bees have been bred as late in the year as *October*.

Hating inactivity and idleneſs, as death itſelf, theſe induſtrious inſects begin early, and continue to the laſt. Labour is their dear and delightful employment.

In morn theſe buſy lab'rers cut the ſky,
Thro' all the gardens and the meadows fly;
And free from envy, by their labours ſtrive,
Which ſhall do moſt t' enrich the common hive.
Such is the employment of their happy days,
And ſuch their title to immortal Praiſe.

Dinſdale on Bees.

Now begin theſe moſt active creatures to traverſe gardens, fields, and groves, diligently ſearching for proper materials to increaſe their numbers, and to improve their ſtore.

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* *Warder's Amazons*, ch. 3. p. 10.

But the flowers being but few, their firſt importations are ſo ſmall and inconſiderable, that without a very cloſe, ſtrict, and accurate obſervation, they will eaſily eſcape our notice. Yet as the ſpring comes on, and flowers, *&c.* increaſe, their burthen becomes more viſible.

Now ſince Bees (as confeſſed on all hands) breed not till the flowers furniſh them with proper food for the young fœtus, and they are ſeen to tranſport this matter daily to their hives, it ſhould ſeem that it is collected for no other uſe, nor devoted to any other ſervice, than the nutrition of the young while in the cells, and not as bread for them afterwards.

The more of this matter they carry in, the greater numbers are produced, and the hives fill the faſter; a plain intimation to me that it is thus employed.

In the midſt of ſummer, when there is the greateſt plenty of honey, and they have not only enough for thoſe of their own family, but for as many more, they continue the practice as in the ſpring; a clear vindication (methinks) that the ſaid matter is purely intended for nouriſhment to the young in the cells, and for no other purpoſe, nor appropriated to any other uſe.

Mr. *Ruſden* alſo obſerves, that the more plentifully this matter is tranſported to their hives, the greater quantity of water is carried at the ſame time, without which they cannot breed. And as the collection of theſe two different materials are aſſumed, ſo likewiſe are they diſcontinued and laid down together.

But I have met with a late objection againſt what I am now diſputing for, from a gentleman in *Bucks*, who has been about the ſpace of twenty years very curious in his remarks and experiments, having kept Bees both in hives and colonies: whom my firſt propoſals brought into my acquaintance.

He objects, ſaying, he cannot believe the ſaid matter is converted or applied to any ſuch uſe, becauſe the liquid, in which the worm or maggot ſwims, is not in the leaſt diſcoloured by ſuch a compoſition or mixture. I cannot ſay ſuch a thing ever occurred to my own thoughts, yet to me the objection ſeems not to carry ſufficient weight to turn the balance, nor to be of force enough to invalidate the contrary evidence, becauſe the quantity is ſo ſmall, and the mixture ſo exceeding fine, that they cannot be eaſily diſtinguiſhed one from the other.

If it be further objected, that there are frequent occaſional additions of the ſaid groſs matter to the other ingredient in this alimentary compoſition, I reply, it is the ſame as to the water, both together being duly intermingled in the fitteſt and moſt juſt proportions.

Who then will, or dare affirm, the element of water alone would as certainly and effectually anſwer the noble deſign, as water together with ſelect and peculiar matter collected from the flowers, when nature hath taught theſe inſects this neceſſary compoſition.

It is perfectly needleſs to obſerve the many noble and moſt excellent deſigns, ſubſerved and accompliſhed by a prudent mixture of flower and water, which is the conſtant ſupport of human life. Men cannot live without bread; yet theſe ſeparate and alone could never anſwer ſuch a purpoſe. Why then may not theſe two ingredients (carefully united) anſwer the end I am pleading for; being ſo admirably adapted to the growth and augmentation of the young, till ſuch time as they quit their cells, and begin to live after another manner, having other means of ſubſiſtence, and a power to feed themſelves.

Moreover, to remove or abate the force of that, or any other ſuch objection, I muſt acquaint the reader, after ſome ſtocks have for ſeveral weeks conveyed leſſer or larger quantities of the aboveſaid matter into their hives; I have very ſtrictly examined, before any young, (or very few if any) had left their places of retreat, (*i. e.* their matrixes;) but nothing of it was to be found alone. To what other purpoſe then can it be appropriated? there being no young, or next to none, to feed upon it.

To me it appears deſigned purely as matter of nutrition to the *Fœtus* in the cells; and no otherways employed. May we not from the whole juſtly conclude, it can be of no other ſervice, than to nouriſh the young.

If it is not thus employed, and converted to this uſe alone, I would gladly learn where and how it is diſpoſed of, ſeeing nothing of it is at that time to be ſeen in the ſame form it was carried in; but curiouſly mingled in the breeding cells.

With this the Doctor ſays the Bees feed their young. If he means the young in the cells, before they break thro' the incloſure, he ſays the ſame thing with *Ruſden*, who oft affirms this mixture is put into thoſe cells, wherein is the egg or ſperm only as matter of nutrition.

But if the Doctor means, that this is food for the young Bees after they are bred, and abroad in the hive, (elſe he ſays nothing to the purpoſe) I deny it; well knowing, that both Queens, Commons and Drones, live only upon honey. In many hives, little or nothing of this matter is to be found in the void and empty cells, Bees in ſuch hives or colonies muſt moſt ſurely live upon honey, and that alone.

Let us for once ſuppoſe a ſtock ſupplied with the greateſt plenty of what ſome call Bee-bread; I dare to ſay it, from frequent obſervation and experience, they would certainly, and ſpeedily periſh, if at the ſame time they were deſtitute of other ſupport.

Oft have I found this verified, greatly to my diſadvantage; many ſtocks at the end of *May* full of Bees, and the ſwarms daily expected, thus miſcarrying; not for want of that ſort of bread, of which there was ſufficient ſtore, but for want of more agreeable and neceſſary food. Great numbers being bred that ſpring, all the former proviſion entirely ſpent, and little honey to be had abroad, both old and young have died together; which I am very well aſſured would not have happened, had theſe authors been right in their ſentiments; the Bees of the ſaid ſtocks having for the ſpace of three months or more carried very large quantities of that ſort of bread into their hives, which was found therein; and yet the inhabitants died of famine, and according to theſe gentlemen, periſhed in the midſt of plenty. I have known both ſingle hives and colonies languiſhing and dying the ſecond week in *May*, merely for want of honey.

Therefore the Doctor's obſervation was very true, *viz.* if in ſpring a ſtock is not very rich in honey, and much cold weather comes to hinder their works, they will be in great danger of being loſt. The brood encreaſing, the old ſtore ſpent, and none to be got abroad, they all periſh together. Therefore the ſtocks that are fulleſt of Bees without a ſufficient ſtore, are in the greateſt danger.*

They begin to breed in the upper part of the hive in the empty cells, next adjoining to thoſe that are filled with honey; gradually deſcending to the lower parts, alſo enlarging the circumference, as the flowers encreaſe, furniſhing them with greater plenty of uſeful and neceſſary materials, till the brood is carried to the outermoſt parts of the combs.

The Doctor tells his readers, the eggs are caſt only into the middle cells appointed for breeding, while thoſe round the hive are reſerved for the honey; nature, or the God of nature, having taught theſe creatures, if they ſhould place their eggs near the outſide of the hive, or box, ſufficient heat would not come to them, to hatch and bring them to perfection; which inconveniency they carefully avoid, by laying their eggs cloſe to one another, near the centre of the hive or box. No eggs (as he adds) are laid nearer than three inches towards the top, bottom, or ſides of hives or boxes; and thus their natural heat alſo keeps them warm, raiſes them in gradation,

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* *Warder*, p. 11.

dation, ſtep by ſtep, till they are hatched and come forth perfect Bees.*

Here alſo I muſt differ from the Doctor, who had ſo long kept Bees in colonies, or tranſparent boxes, which gave him the opportunity of viewing them at all ſeaſons, I wonder he was never ſenſible of his miſtake, which a little attention would have diſcovered.

Here therefore I muſt oppoſe the Doctor (not for oppoſition's ſake, but becauſe it is matter of fact) and tell the world, what I have frequently ſeen myſelf, and ſhewn to many others, the young brood in the outermoſt parts of the boxes and cells cloſe to the back-windows. Firſt the egg, afterwards the little worm, daily encreaſing till ſcaled up in the cell, and at laſt opening a paſſage thro' the encloſure of wax, and forcing it's way out, perfect in all it's parts, tho' not at it's full growth and maturity, which ſeveral days more in the hive are neceſſary to accompliſh.

* It was an error therefore in another author, to ſay the very day they quit the cells in which they were bred, you may ſee them at work abroad, and bringing wax into their hives; which I am well aſſured, for ſome time, they have not an ability for.

It is eaſy many times to obſerve, when a ſwarm riſes, many of theſe young Bees forced out in the croud, and hurry, creeping about the ground before the hive, but unable to fly, and return to their former reſidence, or keep company with the reſt; and conſequently muſt periſh.

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* *Warder*, p. 14.

* Page 90: the author affirms what he has her
been calling error in another man.

The firſt ſtep towards generation of Bees is the egg, depoſited by the Queen in the cell, or matrix prepared for that purpoſe. Mr. *Ruſden* writes, that the ſperm of the King-Bee is injected into each cell after the Honey-Bees have firſt put in ſome generative matter.

I have frequently upon trial found the contrary, eggs in the cells, without any of the ſaid matter mingled with them, therefore I deny the aſſertion; as alſo that the matrix is ſtopped cloſe up, and covered with wax, at the firſt mixture.*

The egg thus fixed in the bottom of the cell, keeps for a few days, (as long as it remains without life or motion) it's form, or ſituation, without the leaſt change.

It's next appearance, or form, is that of a little worm or maggot, and nothing more, turning itſelf into a round or ſemicircle at the bottom of the cell, where it floats in a proper liquid, whereby it is nouriſhed, and it's bulk daily encreaſed.

What the nature of this liquid is Mr. *Bradley* tells us cannot be known, by reaſon of the ſmallneſs of it's quantity; and therefore we remain in doubt whether the ſame be honey carried thither by the Bees, for the nutrition of the embryo, or ſome other matter proper to fructify the ſperm.†

Certainly it is not honey, nor hath the taſte of honey, but only water mixed with the matter before-mentioned, gathered by the tender mothers, and placed in the ſaid cells, as proper food for their ſupport.

Mr. *Bradley* further ſays in the ſame page, of what nature ſoever this firſt liquor may be wherewith the ſmall worm is encompaſſed, it is certain that the Bees afterwards carry honey for it's nouriſhment, and bring them a greater quantity of food, in proportion to their growth, till the eighth day; after which they take no further care of theſe young ones, but ſtop up all the cells. That the ſaid nutritive matter is gradually increaſed, as the worms grow, I entirely agree with him; but that the Bees carry them honey for their nouriſhment there, I abſolutely deny; they taſte no honey more or leſs, till they come out of the cells, and commence perfect flying inſects, are able to feed themſelves, and are no longer fed by their tender nurſes, as the birds uſually feed their young, tho' ſome writers have ſaid as much, and miſled their readers.*

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* *Ruſd.* pag. 55, 56.

† *Bradley*, p. 234.

No ſooner have they forced a paſſage thro' the priſon doors, (of which I have been very oft a delightful ſpectator) but I have ſeen them ſearching after honey in the neighbouring cells; which henceforward is their only food.

After the little worm, continuing ſo long in it's firſt form, is grown to ſuch a ſubſtance, that it can continue no longer in that poſture, erecting it's head, it directs itſelf towards the mouth of the cell.

When it is arrived at a certain bigneſs or ſtature (a ſufficient quantity of ſuitable food, to bring the embryo to perfection being put into the cell) the Bees cloſely ſeal it up, taking no further care about their young: having faithfully ſo far diſcharged their office, they have nothing more to do, but by a natural heat to cheriſh the brood, and haſten the birth.

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* *Purchas's Theatre*, p. 55. *Warder*, p. 26.

And now follows the ſtrange and admirable metamorphoſis. It is manifeſt, that moſt inſects paſs thro' a very great variety of transformations, ſucceſſively aſſuming the form of one living creature, and then another, between which there is not the leaſt reſemblance. Yet the wonderful change is progreſſive and gradual; firſt in one part, and then in another. Opening one of theſe matrixes, wherein is encloſed the embryo, whoſe improving change approaches; what do you behold but an ugly worm, or confuſed maſs of corrupt matter! yet in that putrid maſs are implanted and ſown the ſeeds of ſo noble an inſect.

Thus it lies hid from the eyes of all the living, ſeems to be intombed, and buried in it's grave, without any the leaſt ſign of life; yet have patience, and you ſhall ſee the noble creature riſing, as it were, from the dead, perfect in all it's parts, and in the moſt beautiful form, far more glorious than that laid down. A moſt lively emblem or image of the reſurrection!

The like image of the reſurrection, the author of our holy religion hath given us in a grain of wheat, which muſt periſh and die, before it can multiply, and bring forth fruit.* *To every thing there is a ſeaſon, and a time to every purpoſe; a time to be born, and a time to die and riſe again.*†

In this intermediate ſtate is the principal and moſt affecting transformation. The worm thus interred or ſealed is converted into another living creature; conceived a ſecond time and born anew; immediately commencing

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* John xii. 24. compare 1 Cor. xv. 36. † Eccleſ. iii. 1, 2.

(according to naturaliſts) a nymph or chryſalis: and reſembles (not a little) an infant wrapped in it's ſwadling-cloaths.

Now the ſeveral parts begin to appear, and may be eaſily diſtinguiſhed from each other; firſt the head, and therein the eyes, wherein the colour is obſerved firſt to alter and change to a light yellow, then to a deep dark brown, and then to black; afterwards all the other integral parts or members, as the legs, the wings, horns, with the other two diviſions.

What human mind can fully account for theſe myſterious changes, how myſterious is nature in her operations; which not only puzzle and deceive our bodily ſenſe, but alſo ſo far tranſcend our intellectual powers![‡]

It is diſputed whether the inſect actually dies at the time of it's transformation. It is a living creature beſore ſuch change; hath it's peculiar form, furniſhed with every member ſuitable to it's nature; and bears not the leaſt ſimilitude to that winged inſect, which is ſubſtituted in it's room, and occupies it's place. Thus diveſted of it's eſſential parts, muſt it not inevitably die? doth not the deprivation of the eſſential parts neceſſarily imply the deſtruction of the whole?

There is a living embryo in the preceeding animal; yet if we regard it's form and manner of ſubſiſting, (*quod hoc)* it actually dies, and gives place to a ſucceſſor.

At laſt having gone thro' all theſe changes in the ſpace of 18 or twenty days, it is a perfect Bee; and ſeeks to diſcharge itſelf from a confinement, no longer to be borne, with it's jaws opening a way thro' the cover of wax, which ſecured it in the cell from the chilling air, and every other injury. Now may you (at the glaſs window) ſee one horn appear, then the head entire, and afterwards the whole body (as the paſſage is dilated) diſengaging itſelf; of a lightiſh grey, or aſh-colour; and as yet in it's infantile ſtate. In about a week's ſpace it comes to it's natural complexion, arrives at it's full maturity, and is fit for labour.

[‡] Eccleſ. xi. 5.

Then may you about mid-day, ſee the young brood ſallying out of the hive in conſiderable numbers; after various ſemicircular wheeling motions, taking wing, turning their faces immediately towards the hive or colony, very ſtrictly marking the ſame, as they (in enlarging their circuit) do all the other adjacent parts, and the whole neighbourhood.

In a little ſpace of time, having emptied and recreated themſelves, they return with like diligent and curious obſervation, the more perfectly to underſtand their ſituation, and place of fixed reſidence.

Thus ready and every way prepared for action, we may ſuppoſe them the next day to begin their moſt uſeful, faithful labours, which end only with their lives.

The ſhattered remains of wax, which ſealed up the cell, the other Bees remove, as of no more ſervice; and no ſooner is the matrix cleanſed, and fit for new fœcundation, but the Queen with another ovum, impregnates the ſame.

And thus is there a conſtant ſucceſſion of young brood, never totally diſcontinuing all the ſeaſon, no not in an honey-dew. Of which more in the next chapter, where will be conſidered the agreeable, and moſt commodious habitations they build for themſelves, both as magazines for their treaſure, and nurſeries for their young; the materials they employ therein, together with the ends and uſes of the ſame, as alſo the method wherein the entire ſtructure is accompliſhed.

The Drones owe their original to the ſame cauſe with the Honey-Bees; generated after the ſame manner, and with the ſame circumſtances, except in different matrixes or cells, deſignedly built for them in the Drone-comb; of which there is one in each hive; often two; and ſometimes I have found three.

At other times I have obſerved the ſame comb compoſed partly of cells for the Honey Bees, and the other part of the cells for the Drones; ſuch a one I ſaw in an hive in *October*, 1743. But it is no new thing; I have ſeen it frequently; and many more, no doubt, have done the ſame.

But as there is ſo great an identity betwixt the generation of theſe two ſorts, it would be a vain and needleſs repetition to run over the preceding particulars.

The production of the royal iſſue, or the regents, is more peculiar, and very different from the other two. Generally near the edges, and at the bottom of the combs, and ſometimes from the ſides of an honey-comb, are erected ſeveral oblong orbicular cells, of great ſtrength, eſpecially that part which is it's baſis in which theſe princeſſes are bred.

Of theſe royal manſions or pavillions, a modern writer ſays there is always one in every hive, in ſome two, in others three, tho' but ſeldom.*

But frequently I have ſeen theſe oblong royal matrixes or pavillions in greater numbers; particularly in *October* 1743, no leſs than ſeven or eight at the bottom of one comb, beſides ſeveral in other parts, tho' few of them in full perfection. Mr. *Purchas* mentions nine or ten, tho' the number is uncertain; in ſome more, in others leſs.

This royal cell I have examined, and found an inch in depth: theſe are never demoliſhed. Into theſe cells, Mr. *Purchas* ſays, is injected a ſperma matter, inclining to yellow; wherein, and out of which, the Queen-Bee is bred, being both matter of generation and augmentation; and that ſhe is at firſt, (when ſhe is viſibly any thing) a perfect Bee, in lineaments and ſhape; tho' not in magnitude and dimenſions, and feeds on that wherein ſhe is bred, till ſhe comes to perfection.† The golden matter, of which the Queen is made, is not turned into a worm, but immediately receives the ſhape of a Bee.‡

Doth ſhe feed purely of a ſpermatic matter; and that matter injected by a female? and is ſperm, and ſperm alone, matter both of generation and augmentation? and how will he prove, that tho' both the other ſorts are produced in the manner repreſented, and the young nouriſhed by proper food duly prepared, this principal Bee is generated, nouriſhed, and perfected without any miniſtrations, or contributions of the Commons. Tho'

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* Dr. *Warder*, p. 44. † *Purc. Theat.* ch. 8. p. 29.

‡ *Butler's Fœm. Monar.* p. 62.

Tho' I allow a prolifick virtue in his ſpermy matter, yet ſurely ſome nutriment or other is of abſolute neceſſity to it's improvement and perfection.

Certain it is, whatever that worthy divine has publiſhed to the contrary, that thoſe of the royal race are generated in the ſame manner with the Commons and the Drones, tho' in cells appropriated to themſelves. And that in thoſe cells they are nouriſhed by a very ſelect and peculiar matter gathered by the Commons. What the ſaid matter is, or whence it is gathered, is not eaſy to determine. Yet that it is really peculiar, and very different from that groſs matter, which is employed in nouriſhing the other young, I cannot but conclude from what I have found, and taken out of the royal cells, of a very different kind and quality; being of a gummy, glutinous nature; of a deep red, tranſparent; and would rather diſſolve and melt in the fire, than crumble to powder.

But that this matter is put into theſe matrixes firſt, and the ſperm of the King-Bee injected afterwards, according to Mr. *Ruſden*, I take to be an error.*

One thing here ſeems not ſo eaſily to be underſtood, namely, how the matter thus prepared for the nutrition of the royal fœtus, and formed into a proper liquid, ſhould be retained in theſe orbicular cells, being built perpendicular, and the mouths pointing, and hanging down directly towards the ſtool or floor; turning up an hive full of combs, theſe royal pavillions will immediately preſent themſelves, appearing in the form and poſition now mentioned; yet the thing is true in fact, and may be accounted for.

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* *Mr. Ruſden, p.* 54.

It is alſo an uncertainty what numbers of theſe are bred in a ſingle hive or colony. Dr. *Butler*[*] tells us, he once took up eight of theſe together brought out of the hive, when two at leaſt were gone forth with their ſwarms, and that in 1633, as he received it from a good hand, there were bred in one hive no leſs than ſeventeen.

I dare not deny the truth of the report, but take the liberty to obſerve, that ſome circumſtances in the ſtory make it (with me) the leſs credible; for inſtance, that two went out with the firſt or prime ſwarm, which I never found, unleſs one or twice in forty years; five brought out dead before the ſecond ſwarm roſe, with which five more were brought forth; and the ſame number brought out dead the next day; and yet one continued calling the day following. I only note, it is not uſual with the Bees to expel the royal iſſue, till after the ſwarms are all come forth; nor are they ſo long in expelling theſe ſupernumeraries; the doom being once paſſed, the execution is quickly accompliſhed.

It is above twenty years ago ſince one of my colonies roſe contrary to expectation; but I preſently found it was entirely owing to my own miſmanagement and neglect, in not ſupplying them time enough with another box. About ten days after, the caſt aroſe, which I preſently returned to the colony, and which I was very ſenſible would greatly ſuffer, by taking away from it ſuch a body, after the ſwarm was gone. After they were thus return-

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[*] Dr. *Butler*, p. 4.

ed, they roſe again four times, and I returned them as often; at twice I took from them two commanders, four at two other times, and another time three; being nine in all: after which they roſe no more. The remaining Sovereign, and the other which went out with the ſwarm, made them up eleven in all, which I concluded was the whole number bred in that colony, not finding any other expelled and ſlain.

But as a ſingle ſtock ſeldom ſwarms oftner than twice or thrice, and a few of the blood royal are ſufficient, it is very probable the number ſeldom amounts to ſo many.

Our numbers thus multiplying, and hives filling apace, and ready to grow up into more families, in ſwarms ſoon expected, the next thing to be done, is to provide them convenient habitations, which leads us to take a ſurvey of their ſkill in geometry and architecture in the following chapter.

CHAP. V.

Of the Bees Works, &c.

THE more agreeably to entertain and gratify the reader, and proceed the more regularly, I will begin with the new ſwarms, and follow them *gradatim* thro' the whole gathering ſeaſon.

No ſooner is the ſwarm of Bees hived, but they begin to build their combs, whether for increaſing their numbers, or treaſuring up their honey. So earneſt is their application hereto, that in a week's ſpace (the weather favouring) the hive ſhall be half, or two thirds filled with combs ; which ſurely muſt be on all hands acknowledged an inimitable performance. A diligent obſervance of the moſt admirable ſtructure, it's regular contexture, it's ſtrength, beauty, and deſigned uſefulneſs, muſt force one to acknowledge it a moſt curious and incomparable piece of architecture ; which, however it may be imitated, can never be equalled, much leſs exceeded, by the greateſt artiſt among mankind.

But the firſt thing here that demands our attention, are the materials of which this noble fabrick is compoſed.

Some ancients were of opinion, that ſome tough and glutinous matter (they knew not what) was the foundation of their work. And I find ſome of our moderns inclining to the ſame opinion. Mr. *Bradley* ſays, that they may fix their work at the top of the hive with more ſolidity; they uſe a tempered wax, almoſt like glue.* Bees gather two ſorts of wax; one brown and gluey, which ſerves to ſtop the holes, and fix the honey-combs to the hive; the other for building their cells.

A later writer has told the world, that the materials are compoſed of nothing but glue and wax, which they extract from various flowers.† Had he ſaid the materials had been wax, he had been nearer to the truth.

Whatever theſe, or any other gentleman may fancy or affirm, I do upon the fulleſt evidence declare, that the combs, both in their foundation and ſuperſtructure, are framed of nothing but pure wax. I dare appeal to any judicious and impartial perſon, who will but make trial for the truth of what I aſſert. Let it but be examined by fire, or in any other method, and it will be found to be wax, and nothing but wax.

The manner in which the edifice is carried on and accompliſhed, together with it's form, comes next to be conſidered. Their manner of building is greatly different from that of the waſps, as well as the materials.

The waſps build their combs horizontally, placing them one above another, in ſeveral ſtories, ſupported by numerous and ſtrong pillars; in which, and all their other works, they uſe the utmoſt application and diſpatch.

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* *Bradley's Huſbandry*, p. 225, 238.

† *Nat. Delin.* p. 97, 103, 104.

But the delightful Bees build their combs perpendicularly in a right line, hanging from the ſummit, or top of the hive, down to the bottom.

They lay the foundation of every comb at the top, or upper part of the hive, and carry it down to the floor, from ſide to ſide, faſtening every comb to ſomething ſolid, and able to ſupport it.

How they manufacture the wax, fix it to the hive, and faſhion it in ſo curious a manner into combs and cells, we cannot eaſily account for. Yet we ſee they are perfect maſters of their art, and underſtand how to temper the wax by heat, or by ſome other means mollifying or making it pliable and fit for their purpoſe, and to anſwer very valuable ends.

The principal implement employed in fabricating their combs, appears very plainly thro' the glaſſes, to be their mouths or jaws. I have frequently been a diligent ſpectator at ſuch times, yet either thro' the number of Bees about it, the continual motion, ſeeming confuſion, or elſe the expedition, and quick operation with which their work is carried on and finiſhed, I never have been able to enter into the ſecret, and therefore muſt let it paſs as impenetrable.

Dr. *Butler* obſerves that the artificial cells, which ſerve both for ſtore-houſes for their treaſure, and neſts or nurſeries to breed their young, are made of matter they gather from flowers, and wrought into combs; but done ſo nimbly, that it can ſcarce be perceived.

Theſe cells ſure may be eſteemed to be one of the moſt ſurprizing and exquiſite pieces of workmanſhip.

They are all hexagons, built on both ſides of the comb, but a cell on one ſide is not placed directly againſt a cell upon the oppoſite ſide; but the baſis of a cell on this ſide anſwers to three third parts of the hexagonal baſis of three contiguous cells on the other ſide, meeting all in a right angle in the centre of the oppoſite bottom, which ſerve both for elegance and ſecurity, ſtrength and beauty.

Thus they appear maſters of geometrical meaſures and inventions: all the cells thro' the hive are regular and perfect hexagons, and equilateral; are ſupports to each other, and wiſely and artificially contrived; the wax being diſtended into the fineſt and moſt curious membrane poſſible, which framing numerous cells moſt cloſely connected with one another, the whole fabrick is effectually ſupported.

It is ſurprizing to ſee ſo many thouſands of theſe inſects, merely by natural inſtinct, framing their combs with ſo great a curioſity, regularity and order. But a ſtrict and diligent view of one of theſe combs newly erected, will enable the reader to form a more juſt and perfect idea thereof, than the fulleſt deſcription given of it by the pen.

Moreover, there is this advantage in it's figure, that there is not the leaſt room loſt; no vacuity or empty ſpace through all the hive. And ſuch is the delicacy and fineneſs of the compoſure, that when the cells are filled with honey, they appear as one ſingle and ſolid body.

The ſquare, together with the equilateral triangle, have the like advantage; yet ſeem leſs capacious and extenſive, this figure having a greater affinity with the ſphere.

The combs are alſo (generally) placed at equal diſtances, there being only room for two Bees to paſs abreaſt, without any needleſs empty ſpace. Wax is one of their chiefeſt manufactures, and abſolutely neceſſary to treaſure up their honey, and for brood. But here I find ſeveral of our modern writers far from truth in their reports.

Mr. *Bradley* tells us, that from the flowers they gather the wax with the hairs, which cover their Bodies; and when they return from the fields, you may ſee their hairs full of ſmall particles of wax like duſt. When they are got into the hive, and give notice to their companions, three or four of them come and take each a ſmall quantity of the wax, with their jaws, till no more remains, when they return into the fields for a new harveſt. Or elſe the laden Bee finds out a cell, where there is neither honey nor worm, and there leaves thoſe bodies of wax.

He likewiſe adds, as one Bee goes, another comes, to temper the wax till the hive is almoſt full of this ſort, placed ſometimes in lays of divers colours, as white, yellow, red and brown, according to the flowers or leaves from which they gather it. And in ſeveral parts of the hive, a great number of cells are found full of this wax, which are as magazines, to which they have recourſe upon occaſion. Finally, the wax in the cells, which at firſt is of different colours, is always white immediately after the honey-combs are built.* How has this author in this account betrayed his great ignorance, and abuſed his reader? That

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* *Bradley*, p. 239, 243.

That ſuch quantities of wax are depoſited in the empty cells, I never, thro' ſo long an acquaintance with Bees, could obſerve, and know it is a great miſtake, neither is the wax, as gathered by the Bees, of different colours, but always white, and the ſlighteſt examination would have been ſufficient to have convinced him he was in an error: nay the diverſity of the colours alone, if attended to, would have done it.

And as there is ſo manifeſt and great a contrariety in nature between duſt and wax, it muſt be an unpardonable weakneſs in ſuch a profeſſor thus to confound them. That the wax placed in the cells ſhould be of ſuch various colours; and immediately (when formed into combs) white, is very ſtrange and unaccountable.

In this article we alſo find a modern *French* author guilty of the ſame error, telling us they always keep a conſiderable ſtock of this in reſerve, collect it in their hair, with which their bodies are plentifully covered over, and it is agreeable to ſee them roll in the yellow duſt, which falls from the chives to the bottom of the ſtowers, and then return inveſted with thoſe grains. They alſo, according to him, carry away the little particles of it with their jaws and fore-feet.

Theſe collectors at their return have proper aſſiſtance and attendants ready at the hive-door, on purpoſe to eaſe them of their loads, as ſoon as they arrive; whereas the former repair to the field again, in order to collect new ſtore, while thoſe which helped to unload, convey their charge into the general magazine; yet ſome of the other convey it to the apartments, and unload it themſelves.* But that is a work of ſupererogation. And why not all of them? all this is ſo entirely fancy, and far from fact, as to need no further confutation.

That I may more fully ſatisfy my reader in this point, and at the ſame time ſhew how remote the ſaid authors were from truth, I ſubjoin the following remarks.

It is ſo fully manifeſt and obvious, that what is for ſeveral months together ſo plentifully imported into the hives, is not wax, nor hath the leaſt affinity with wax, that it is not to be contradicted, tho' ſeveral of our writers contend for it, and it is generally accounted ſuch by the populace.

Both *Butler*, *Purchas* and *Ruſden*, have fully confuted this vulgar error in the particulars following. When the hives have been for a year or more filled with combs down to the floor, and there is no more room to build, they yet carry of this ſaid matter in the greateſt plenty; and even when no more wax is wanting, only to ſeal up the honey, and the breeding cells, for which a very ſmall quantity is ſufficient.

Further; do but examine the ſaid matter with your fingers, and you will preſently perceive the particles to ſeparate from each other, and crumble to powder, whereas wax, on the contrary, will adhere and cleave together: or if you carry it to the fire you ſhall ſee it turn to aſhes and duſt, when the other ſhall melt and diſſolve. A plain evidence it is not wax!

The diverſity again of it's colours is an additional proof of what I am diſputing for. Senſe itſelf is an evidence.

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* *Nat. Delin.* p. 106.

vidence. Wax, both as it is gathered, and wrought into combs, is always white, as any perſon may eaſily ſatisfy himſelf, and nothing but the age of the combs, and breath of the Bees, changes it's colour.

Moreover, it is eaſy to obſerve, that new ſwarms for the firſt, ſecond or third day, carry in little or nothing of this ſaid matter; when in that ſpace of time, they have, (inviſibly) conveyed into the hive ſufficient quantities of wax, formed into ſeveral large combs. On the contrary it is certain, that when they carry in moſt abundantly of the ſaid matter, they collect the leſs wax, and the reaſon is plain: the new ſwarms want the wax, and the old ſtocks want food and nouriſhment for their young.

This might ſatisfy any perſon that this is not wax, yet I will add a further proof. For ſeveral ſeaſons after I became a Bee-maſter, I was very deſirous and diligent to find out how, or where, they brought home their wax, well knowing that groſs matter to be of a very contrary nature, and applied to ſome other uſe, but was not able, for a conſiderable time, to enter into the ſecret.

At laſt, viewing a hive of Bees very buſy at labour, I obſerved one Bee among the reſt as ſhe fixed upon the alighting place, of an unuſual appearance; upon which I ſeized her directly, before ſhe had time to enter the hive; where, with a very ſenſible pleaſure, I found what I had (till then) been in vain ſearching for. Upon the belly of this Bee, within the plaits, were fixed no leſs than ſix pieces of ſolid wax, perfectly white and tranſparent

rent like gum; three upon one ſide, and three upon the other, appearing to the eye equal in bulk and gravity; ſo that the body of the Bee ſeemed duly poiſed, and the flight not in the leaſt obſtructed by any inequalities.

Here have I found it at other times, and once I took away eight pieces together, and I knew that it was wax and nothing elſe. Will not this paſs for demonſtration? ſome, who have wrote upon theſe inſects, have obſerved, when the Bees return to their hives laden with wax, in order to diſburthen themſelves, they give notice to their companions, when three or four come, and take each a ſmall quantity of the wax with their jaws; and after them ſeveral others, who take their ſhare of the lading, till no more remains; and then theſe porters go back into the fields to fetch more.* A Bee at work on the combs, requiring honey, it is offered her by another coming home, and ſhe receives it with her trunk without ſpilling. For what reaſon (honey being at hand) I know not.

I only reply, I believe not the report, (tho' it might be that author's opinion) ſince all my obſervations of Bees have never diſcovered any ſuch practice among them.

And tho' I am far from affirming it as matter of fact, yet I propoſe it as my humble opinion, that thoſe very Bees that gather the wax, do alſo themſelves manufacture, and frame it into combs. It ſeems to me moſt reaſonable ſo to think. But I leave every reader to his own judgment.

CHAP.

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* *Bradley*, p. 240, 247.

CHAP. VI.

Of the Swarming and Hiving of Bees.

"THE principal reaſon why they ſwarm is "the want of room. Therefore in colonies, where they are not at all ſtraitened, they ſeldom or never ſwarm, "except (ſays Mr. *Ruſden*) thro' diſtaſte, diſturbance, or miſmanagement.

"And in hives they ſwarm not merely for want of "room, without other concurring circumſtances; ſuch "as a king in readineſs; multitude of ſubjects, proſpect of plenty; together with weather, which is inviting."

Every ſwarm is compoſed of all the three ſorts, *viz.* a Queen, great numbers of common Bees, both old and young, and Drones, whoſe numbers are uncertain; ſome ſwarms have more of theſe than others. Dr. *Butler* is of opinion, that thoſe ſwarms which have moſt Drones will moſt ſurely proſper, but I doubt it, till I ſee it proved.

The multitude of ſwarms does not predict or promiſe the proſperity of an apiary. Witneſs the laſt ſummer; in which I had no leſs than 86 or 87 ſwarms; a conſiderable number of which at *Michaelmas* had not honey half enough to maintain them till the ſpring.

The old ſtocks alſo ſending forth ſuch multitudes (ſwarming moſt of them twice, and many of them three times) they were greatly reduced in ſtrength, and in ſtore. Many about the country are already dead, both old and young; and no doubt but many more will yet die.

Neither do the earlieſt ſwarms always prove the beſt, or proſper moſt, as early as the latter end of *April*, or the beginning of *May*. The weather often afterwards is very wet and cold, ſhuts them in, and prevents ſo long their labours, that I have frequently known even theſe either totally deſtroyed, or exceedingly reduced.

But ſwarms at the latter end of *May*, or beginning of *June*, ſhall proſper, and anſwer the owners expectation.

Three years ago I had a ſwarm upon *Midſummer-day*, which laid in a ſufficient ſtore of proviſion for their ſupport, till the ſpring following, and they ſwarmed that ſummer, either the laſt day in *May*, or the firſt of *June*, and every ſummer ſince.

And it is more than twenty years ſince I had a ſwarm the beginning of *July*, which ſtood thro' the enſuing winter, and proſpered well.

When you obſerve your hives well repleniſhed with Bees, and begin to lie forth about the hive's mouth in the day-time, and go in at night, and alſo the Drones appear, you may expect ſwarms, eſpecially if the weather be clear, calm, and warm; for in a cloudy, wet, and ſtormy ſeaſon, the firſt ſwarms ſeldom or never riſe, tho' the caſts, or ſecond ſwarms, often riſe in indifferent weather.

And whenever you ſee them gathering together in little cluſters upon the hive, or ſtool, you may infer they are preparing and even ready for a dance; and may expect them to riſe preſently.

Get your hives in readineſs, and of different dimenſions, that you may the better ſuit them to the ſwarms. To over-hive them will be a great diſadvantage. If under-hived the prejudice is the leſs, and it is eaſy to give them enlargement.

An hive holding three pecks, or two pecks and an half, will be a fit ſize for an early ſwarm of eight or ten thouſand Bees. An hive of leſs meaſure will be large enough for thoſe that come later in the year, and in leſs numbers.

It may perhaps be of ſome ſervice here to acquaint the reader with an experiment I made in *October* 1743, when putting the Bees of a ſmall and late ſwarm, into an empty hive, and afterwards upon a table, I took a particular account of their meaſure, weight, and number, in meaſure a quart, in weight one pound and a quarter, in number two thouſand. I firſt impriſoned the Queen, and having a perſon at hand to aſſiſt me in the operation, particularly in counting them over, which took up the greateſt part of the time, we had gone thro' the whole trial, and perfectly finiſhed it, before the leaſt ſign of life could be ſeen in one ſingle Bee. But in a few minutes more, ſome ſigns of life began to appear firſt in their moving legs, and then in other parts; upon which I put them into another ſtock, where they are ſtill in being.

From hence it is eaſy to compute the number of Bees in a ſwarm, of four or five pounds in weight, *viz.* eight thouſand, or upwards; proportionable to which would be an hive of ſuch an extent.

You hives thus at hand, you may dreſs them agreeable to your own fancy. I rub mine only with a ſmall handful of fennel, dipped in a little ale ſweetened with ſugar, ſometimes with nothing at all, except it be a new hive.

It is a common practice with moſt to place ſticks in the hive, the better, as they ſuppoſe, to faſten the combs. But if your hives are of a right form, and narrower at the mouth than the middle, I ſee not any the leaſt occaſion for ſuch a precaution. The Bees will themſelves effectually ſecure the combs from falling.

Beſides, you will gain this advantage by this means, *i. e.* taking out the combs full of honey, in a manner entire, and not broke in pieces.

The two principal ſwarming months are very well known to be *May* and *June*. As to the hour of the day it is not certain; I have known them to riſe near eight in the morning, and after four in the afternoon; but moſt generally between eleven, and one or two. It might not be amiſs to have a watchful eye upon them a good part of the day. And now be ſure to give them door-room enough, opening the whole paſſage for them, tho' it be a week or ten days before the ſwarm comes.

As ſoon as your ſwarm is ſettled, hive them to prevent any other joining with them. The method of hiving them, you will learn from their place and manner of ſettlement. A twig or ſmall branch you may gently cut off with a ſharp knife or ſaw; or ſhake them into the hive, ſetting it down upon a cloth, ready ſpread upon the ground, with a little ſtick placed acroſs to bear up one ſide, to give them the liberty of paſſing in and out.

If you ſhake them into an empty hive, and many (as is uſual) return to the place, repeat the action as often as there is occaſion; knocking them out of the empty hive upon the cloth, you will with pleaſure ſee them croud to their companions in the other hive, like ſheep into a fold.

But if they ſettle, as ſometimes, upon the body or large arm of a tree, &c. the beſt way is with a bruſh, or a little handful of ſmall branches, to ſweep them into the hive.

Being thus fixed in a new habitation, in the evening when they are all within and quiet, carry them to the place you have appointed for them; leaving them no paſſage into or out of the hive, but only at the door, which may be gradually reduced to a narrower compaſs.

When they are ſwarming, and dancing a *Levalto* in the neighbouring cloud, I never entertain them with any ſort of muſick, as do the country people, which drowns the delightful and more melodious ſounds of the Bees. Nor is it of any ſervice.

I have often known the Queen fall upon the ground, not being able to fly, thro' ſome defect in her wings; then the ſwarm returns home again; and the next time they riſe, they have another Sovereign. I have known the ſwarm ſtay in the hive near a fortnight before they roſe again ; and perhaps waited for a leader. Sometimes they roſe no more.

The poor diſabled, unhappy Princeſs I have picked up in the graſs, but never without ſome attendants, whom nothing but violence could ſeparate from her.

Their Language.

AS to the time of ſecond ſwarms, we (generally) fix it to a day or two, and know when to expect them, by means of thoſe diſtinct, peculiar, and muſical notes, which are always heard two or three days before they riſe.

Bees certainly have a language among themſelves which they perfectly underſtand, tho' we do not, or at beſt very imperfectly. Eight or nine days after the prime ſwarm is departed, one of the young Princeſſes, addreſſing herſelf in a very humble and ſubmiſſive manner to the Queen-mother, petitions for leave to withdraw, and erect a new empire, with a ſelect body of the populace.

The Regent for a time ſeems ſilent, and for a day or night there is no anſwer, nor any grant given ; however, the young Princeſs (bent on a crown and kingdom) continues her ſuit, and at laſt ſucceeds. The ſecond night you may hear the Queen, with a very audible voice (being an eighth) giving her royal grant, and proclaiming it as by ſound of a trumpet thro' the whole kingdom. Her voice is a grant, her ſilence a denial. And the day following (the weather being tolerable) you may expect the ſwarm.

It is delightful to attend to thoſe peculiar and muſical ſounds or notes, being an eighth or chord, which is truly harmonious. Dr. *Butler* has taken pains to ſhew us the compaſs the ſong contains in the gamut, or ſcale of muſick: the Queen compoſing her part (or baſs) within the four lower cliffs; and the Princeſs hers (a treble) in the four upper cliffs. The ſwarm ready to come forth, the notes are louder, quicker, and more conſtant. When the greater part of the ſwarm is out, the muſick is at an end, and we hear no more. Sometimes the royal grant is revoked, and then all the royal iſſue are ſlain.

As every general rule has an exception, I muſt tell my reader, that the ſecond day of *June* 1716. after a ſwarm was come out, that very evening, and the two following, they gave notice for a ſecond ſwarm, which roſe the fifth day, when I joined them to the firſt. That night, and the next, they called as before, and roſe twice; I returned them both times, at each taking a Queen from them: a few days after they roſe a third time, ſettled, yet went home again. Finally, they roſe a fourth time, when I took two Queens from them, putting them back to the old ſtock, after which they came forth no more. I mention this as being very ſingular, and what I never obſerved before, nor ſince.

I very perfectly remember, tho' many years ago, I heard theſe previous notices given for a firſt ſwarm, which are exceeding rare (that being the only time I ever took knowledge of them) and in a colony too; where placing my ear cloſe to the top of the uppermoſt box, I could very eaſily and diſtinctly hear the leaſt noiſe, and what was acting about the throne. And juſt as the ſwarm began to riſe, there ſeemed to be the greateſt lamentation among the branches of the royal family. Notes of woe expreſſive of the deepeſt ſorrow, as tho' they were taking an eternal farewel of one another.

With the ſecond ſwarm two of the royal Princeſſes go forth very often, and ſometimes three, in hopes to gain a kingdom. That Princeſs, who is ſo happy as to get the throne firſt, is proclaim'd Queen, and crowned; the reſt are all ſlain, as I have found them the next morning.

It is very ſeldom I keep theſe ſecond ſwarms, well knowing they ſeldom anſwer any good purpoſe, except two or three are joined together. Beſides, the old ſtocks greatly ſuffer thereby; for which reaſon I frequently return them, knocking them out before the old ſtock. I would adviſe others to do the ſame, which would not a little help the old ſtocks, and in the end turn to the advantage of the owners. And taking their Queen from them, they would not be ſo apt to riſe again.

To put two caſts together has little difficulty in it, eſpecially if they come the ſame day; it is only at night fixing the mouth of one of the hives upwards, and placing the other directly upon it, when one ſmart ſtroke with your hand will beat the whole body down into the under hive, which you muſt preſently ſet again upon a cloth, that they may ſettle and compoſe themſelves. After which put them in their place.

But ſo many and various are the circumſtances about the ſwarming and hiving of Bees, that it is impoſſible to give directions in them all. Common prudence will direct in many caſes; and the reſt muſt be learned by obſervation, practice, and experience.

In hiving ſwarms (if you are afraid of their ſtings) you may ſecure yourſelf by a thin veil over the face, or by waſhing it with the ſweet liquid uſed in dreſſing the hive.

In a very hot ſeaſon, when the Bees are more apt to ſtrike, I have (tho' not often) put on ſuch a veil; but I have ſeldom been ſtung, unleſs accidentally I happened to cruſh one.

The laſt ſwarm I had a ſummer or two ago never ſettled at all, but croſſing a wide ſtreet, they fled over the houſes, and entering in at the ſide piece of a back-building, found a paſſage into the funnel of a chimney, and had choſe that for their habitation. Reſolving to diſlodge them from this place, I got a large quantity of combuſtible matter, fit for ſuch a purpoſe, and ſet it on fire, which preſently brought them to light. No ſooner did the ſmoke begin to fill the chimney, but firſt we heard a ſtrange uproar and confuſion, and preſently conſiderable numbers came down into the room, thro' the fire and ſmoke, and ſome periſhed therein, and the reſt were let out at the window, but the main body eſcaped the way they entered, ſettling on the outſide wall, whence we got them with ſome difficulty into an hive, in which they proſpered ſome years, producing ſeveral ſwarms.

In the year 1717. one of my ſwarms ſettling among the cloſe-twiſted branches of a codling-tree, and not to be got into an hive without help, my maid-ſervant being in the garden, offered her aſſiſtance, to hold the hive while I diſlodged the Bees.

Having never been acquainted with Bees, ſhe put a linen cloth over her head and ſhoulders, to guard and ſecure her from their ſwords. A few of the Bees fell into the hive; ſome upon the ground; but the main body upon the cloth which covered her upper garments.

I took the hive out of her hands, when ſhe cried out, the Bees were got under the covering, crouding up towards her breaſt and face; which put her into a trembling poſture. When I perceived the veil was of no further ſervice, ſhe gave me leave to remove it. This done, a moſt affecting ſpectacle preſented itſelf to the view of all the company, filling me with the deepeſt diſtreſs and concern, as I thought myſelf the unhappy inſtrument of drawing her into ſo imminent hazard of her life.

Had ſhe enraged them, all reſiſtance had been in vain, and nothing leſs than her life would have atoned for the offence.

I ſpared not to urge all the arguments I could think of, and uſing the moſt affectionate intreaties, begging her with all earneſtneſs in my power, to ſtand her ground, and keep her preſent poſture; in order to which, I gave her encouragement to hope for a full diſcharge from her diſagreeable companions.

I began to ſearch among them for the Queen, now got in a great body upon her breaſt, about her neck, and up to her chin. I immediately ſeized her, taking her from among the croud with ſome of the commons in company with her, and put them together into the hive. Here I watched her for ſome time, and as I did not obſerve that ſhe came out, I conceived an expectation of ſeeing the whole body quickly abandon their ſettlement; but inſtead of that, I ſoon obſerved them gathering cloſer together, without the leaſt ſignal for departing. Upon this I immediately reflected, that either there muſt be another Sovereign, or that the ſame was returned. I directly commenced a ſecond ſearch, and in a ſhort time, with a moſt agreeable ſurprize, found a ſecond, or the ſame; ſhe ſtrove, by entering further into the croud, to eſcape me, but I re-conducted her, with a great number of the populace, into the hive. And now the melancholy ſcene began to change, to one infinitely more agreeable and pleaſant.

The Bees preſently miſſing their Queen, began to diſlodge, and repair to the hive, crouding into it in multitudes, and in the greateſt hurry imaginable. And in the ſpace of two or three minutes the maid had not a ſingle Bee about her, neither had ſhe ſo much as one ſting, a ſmall number of which would have quickly ſtopped her breath.

How inexpreſſible the pleaſure which ſucceeded her paſt fears! I never call to mind the wonderful eſcape, without a ſecret and very ſenſible pleaſure.

This memorable eſcape inſpired her with great courage, conſimilar to theſe bold, daring, and undaunted inſects. That ever after ſhe would reſolutely undertake the moſt hazardous ſervices about them.

April 30, 1737, I had a ſwarm, which ſwarmed again *June* 22d the ſame year.

Keep your hives as full of Bees as you can, for poor weak ſtocks will but diſappoint you. And thus will you have little or no occaſion for feeding.

How to order Bees in Hives.

AS ſoon as a ſwarm is put into an hive, they marſhal themſelves after their uſual manner, leaving a vacuity or empty ſpace in the height of the hive, to give the labouring Bees liberty to carry on their work.

They have indeed a commodious houſe, as a place of refuge and of reſt, but no proviſion; many mouths, but no meat; and likewiſe all their winter-ſtore to lay in. If then they would hive, labour is abſolutely neceſſary, and no time is to be loſt.

The very day therefore their owner put them into an houſe, they begin to furniſh it, to lay in food, and gather honey; as alſo wax, which is now for ſome time their principal employment, that they may have their magazines in readineſs to receive the treaſure.

This then being their time of harveſt, prevent (to your power) whatever may incommode or hinder them.

All the month of *June*, and to the middle of *July*, let them have room enough for labour. Then begin to ſtraiten the paſſage; for no ſooner doth honey begin to fail abroad, but the robbers will be trying to break in and ſteal.

In the next month make the paſſage ſmaller ſtill, ſo a few Bees will more eaſily guard it.

This is the worſt month in all the year for robbing; and therefore a ſtrict and daily inſpection and overſight is requiſite.

The method I uſe is as follows; which effectually prevents the entrance of the mice (their mortal enemies) and the ſinking of the hive's mouth, when it is old, which often ſtops the paſſage, and ſhuts them in, greatly to their prejudice.

Take a ſquare piece of deal above four inches long, and cut a door-way in it the length of three or four inches, and more than a quarter of an inch in depth, that a large Bee or Drone may eaſily paſs it. Place this at the mouth of the hive, to be enlarged or leſſened according to the ſeaſon of the year, and as you ſee occaſion.

When the hives are full of Bees remove it, and replace it after the ſwarms are come forth.

If in this, or the following month, you obſerve any hive daily attempted by robbers; but eſpecially if you find the Drones in an hive, after they are expelled all the other ſtocks, you have great reaſon to ſuſpect the loſs of the Queen, and conſequently the total diſſolution of the whole ſtate; and ſo the moſt prudent way will be to take them in time.

The month of *October* is the beſt for feeding Bees, or taking them for your uſe, either thoſe ſtocks which are very rich, or thoſe that are too poor to ſtand till next ſummer without your aſſiſtance. Keep none that weigh not twenty pounds.

If you have not watering places near, ſet a trough of wood or ſtone in your garden, filled with gravel, and kept always moiſt, for them to drink.

Of Feeding of Bees.

FEEDING Bees is what I have no great opinion of, and very ſeldom practiſe; yet it may ſometimes be neceſſary, as when new ſwarms are in want. Various are the methods uſed in feeding of Bees, as well as the materials, as ſugar, ſalt, ſweet-wort, &c. which cannot be laid up for future ſupply.

Honey alone is their natural and proper food; and when there is a real neceſſity to feed any, give them no leſs than a pound, or two pounds at once, and repeat it, till you have furniſhed them with a ſufficient quantity. This they will lay up in the cells for future ſtore.

The manner of adminiſtering it may be this. Let your honey be brought to a due conſiſtence, or a liquid, by water, or ſmall beer mixed with it; then pour it into a veſſel prepared on purpoſe, or into an empty comb, a Drone-comb (being ſtrongeſt) is the beſt; and in the evening when all the other Bees are quiet, gently raiſing the hive on one ſide, put it under; and the next day they will, with the greateſt chearfulneſs, convey it into the magazines.

If you give it in ſome other veſſel, ſome precautions will be neceſſary to prevent drowning themſelves in it. At ſuch times be ſure to keep the paſſage or door ſtrait, for fear of robbers. It would not be amiſs to feed in a cloudy, miſty ſeaſon, when the Bees ſtir leaſt abroad; and begin to feed them in time. I never gave leſs than a pound and an half, or two pounds together.

If in ſpring they need any further help, let them not want; the gathering ſeaſon being at hand, when they will be able to help themſelves, and reward your kindneſs and compaſſion.

Several times I have ſaved them, even at the laſt, when not a Bee was able to come down, by dropping a ſpoonful of liquid honey among them in the combs; and afterwards offering them what was wanting.

The common, but cruel method of taking hives, at this ſeaſon of the year, is by burning with fire and brimſtone. To which I can by no means be reconciled, and here in this publick manner proteſt againſt, preferring to it fumigation; whereby with ſafety we may become poſſeſſors of their treaſure. But that will be conſidered in a chapter by itſelf.

The way of driving Bees, in order to come at their honey, I utterly diſlike, and am an enemy againſt, becauſe the honey muſt be foul and corrupted; and what is ſtill worſe, great numbers of young brood (the beſt of the Bees) utterly deſtroyed, and by that means thoſe ſtocks greatly reduced and endangered.

In *October* and *November* take particular care to ſecure their winter quarters, that neither the weather, nor other enemies, hurt them.

In the end of *January*, or in *February*, lift them gently from the ſtools, and cleanſing the filth, ſet them again in their place. And if your ground will allow, let them ſtand a full yard diſtant from each other, and not too great numbers in one garden; for by that means I had no leſs than ſeven ſwarms the laſt ſummer, which ſettled all together.

Of the Honey-Dew.

WHAT the honey-dew is, is diſputed among the learned.* According to the ancients it was an efflux of air, a dew which fell upon flowers.

The moderns ſay it is rather a perſpiration of the fineſt particles of the ſap in plants, which evaporating thro' the pores afterwards condenſe upon the flowers.†

Pliny was much in the dark about it, and writes doubtfully of it, aſſerting, it was either the ſweat of heaven, the ſpittle of the ſtars, or the moiſture of the air purging itſelf.‡

Dr. *Butler* judges it to be the quinteſſence of all the earth's ſweetneſs (*i. e.* of the flowers) exhaled, as other dews in vapours, into the loweſt region of the air, by the continued and exceeding heat of the ſun, and condenſed there.§

And thence I have very often ſeen it deſcend, in a clear day, like an exceeding fine rain; and eaſily diſcerned it againſt the light of the ſun for many hours, if not a whole day together. The Doctor's reaſons are theſe.

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* *Mel roſcidum.*

† *Nat. Delin.* p. 108.

‡ *Sive illud ſit Cœli Sudor, ſive quædam Syderum ſaliva, ſive purgantis ſe Aeris Succus.*

§ *Butler's Fœm. Monar.* p. 111.

When the year is backward in it's fruits, the honey-dews are the ſame.

In hotter, and more ſouthern climates, where the fruits and flowers are moſt forward, theſe dews are more timely. Alſo becauſe thoſe countries, which have the greateſt plenty of the beſt and ſweeteſt flowers, have always the pureſt honey.

And certain it is, that the hotteſt and drieſt ſummers do produce the greateſt and moſt frequent honey-dews. And in cold and wet ſeaſons, few or none of them are to be ſeen.

It is the moſt generally received and prevailing opinion, that theſe honey-dews conſiſt of vapours raiſed in the third region, and being thoroughly purged and digeſted by the heat of the ſun, and condenſed, fall down to the earth.

But as plenty of honey falls from above, ſo is there a native ſweetneſs in plants, flowers, &c. whence the Bees carefully and conſtantly gather it; and as they extract it from the flowers, they do not, (as ſome writers affirm) defecate, concoct, and refine it; but as nature produces it, they fill their little bags with it, immediately tranſport it to their hives, and diſcharge it into the magazines; which done they go back for more.

Much leſs do Bees make the honey, tho' ſome tell us the dew is not honey, except it be gathered by the Bees, concocted in their bodies, and condenſed by their heat in the combs.

And it is the opinion of many authors, that there is no material or ſubſtantial difference between the honey-dew, and the ancient manna of the *Iſraelites* in the wilderneſs.

The Manna fell on the ground like hoary froſt, was gathered early before the ſun waxed hot, and taſted like wafers made with honey, which ſhews ſome ſimilitude and agreement betwixt them.

Honey was the ſugar of the ancients, and the *Romans* uſed it in their feaſts.*

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* *Purchas's Theat.* p. 155.

CHAP. VII.

Of Bees Wars and Robberies.

THERE is not any thing relating to theſe inſects, that has given me ſo much uneaſineſs and labour, as their martial ſpirit, ſtriving to enrich themſelves, at the expence and ruin of their neighbours.

Not that they are influenced by, or act from a principle of cruelty and injuſtice; but their fighting and plundering of one another ought rather to be imputed, either to their perfect abhorrence of ſloth and idleneſs, or to their inſatiable thirſt for honey; for when no honey is to be had among the flowers abroad, but only among their neighbours, they will venture their lives to get it there, and not a hive within their reach is left unaſſaulted. Now the trumpet ſounds to arms, and theſe true ſons of *Mars* prepare themſelves for war. And many a terrible battle have I beheld between the one and the other, and great multitudes quickly ſlain.

A few Bees perhaps at firſt find means to paſs by the guard, and encouraged by repeated ſucceſs, they return with freſh forces, conſtantly encreaſing the number, till the invaſion is too powerful to be oppoſed, and the hive is entirely ruined.

The eleventh of *Auguſt* 1716. my little daughter came running to me, (being in company) and told me the Bees were ſwarming; but I gueſſed them to be robbers, which I preſently found true upon entering the garden; where I beheld a dreadful battle, and great numbers dead upon the walks, having broke at once into ſeveral hives. Nor was there one ſtock or colony left untried, tho' in all about thirty. Here I had employment enough. Immediately I ſtopped up two of them very cloſe, and by other means, in leſs than an hour, I ſecured all the reſt, and the robbers diſappeared.

The end of *July* 1743, taking a walk to one of my apiaries, I no ſooner heard the noiſe of the Bees, but I was perſuaded they were employed in theft and robbery, and preſently found they had violently aſſaulted ſeventeen hives in another Bee-garden at a ſmall diſtance. Great numbers were broke into one of them, and carrying out honey with little or no oppoſition, which I directly ſecured. Upon that, they fell upon the two next with the utmoſt fury, and in vaſt numbers, which obliged me to ſhut up them alſo, and cover moſt of the reſt. When for the ſpace of an hour, or more, I had a very warm encounter with the robbers before I could force them to retreat. At night I opened the paſſages, and gave the thieves liberty to return home.

The next morning they made a freſh and very vigorous aſſault, but I was then prepared for them, being ſure of this ſecond viſit; when after another ſmart conflict, I gained a compleat victory, after which they returned

turned no more in that hoſtile manner. That ſtock which ſuffered moſt is now ſafe, and in all probability will proſper.

Hence may the reader take direction how to act in ſimilar caſes: inſtantly ſtop up ſuch hives till evening; then diſcharge the ſtrangers. Keep the ſtock cloſe ſhut up the next day, which will give you a fair opportunity of engaging the robbers by themſelves, and effectually prevent further attempts. Yet provided they ſhould afterwards return, when your doors are again ſet open, diſturb the true Bees by a bunch of ſtinking madder faſtened to the end of a little ſtick of a convenient length, till they begin to ſhew their reſentment; then will you ſee them ſeize the robbing Bees, and tumble them down in the greateſt wrath; ſo that you may aſſuredly infer their ſafety. They will beſt defend themſelves. But at the time you are thus employed, it is needleſs to give you a caution to take care of yourſelves. But ſhould your hives thus attacked have but a few Bees, and little honey, it is better to take them, than ſtand a trial.

I never loſt any ſtocks by the robbers but once, which was occaſioned purely by my abſence; paying a viſit at *Woodſtock*, at my return I found two hives in a manner ruined, and took what little honey was left in them.

I have at other times been a witneſs of fatal battles, of more than two days continuance, occaſioned by a ſtrange ſwarm forcing their way into a ſingle hive or colony.

Alſo two ſwarms going together ſometimes quarrel, till great numbers have been deſtroyed, or one of the Queens ſlain, which ends the conteſt, when the commons on both ſides unite under the ſurvivor.

All ſtocks of Bees, whether in hives or colonies, are ſo many diſtinct communities or kingdoms, and entirely independent. As ſuch, they live in perfect peace and unity among themſelves, but have no intercourſe or friendſhip with one another, but rather live in perpetual enmity and wars.

It is ten thouſand pities that ſuch excellent and uſeful creatures ſhould thus plunder and deſtroy each other. To prevent which, obſerve the foregoing directions.

Thus have we travelled with them thro' the ſeveral ſeaſons; at the ſame time taking cognizance of their ſeveral ſorts, together with their different offices and employments.

That of the Queen, both day and night for ſo many months together, muſt be very operoſe and laborious; her province muſt be very hard and difficult, tho' all is acted within doors. So large a family to raiſe and ſuperintend, ſo prodigious a multitude of eggs to lay, which occaſions her conſtant travel from cell to cell, and neceſſity of running the ſame round without the leaſt reſpite, conſtant and impartial juſtice to be adminiſtred thro' the whole ſtate, to every member of the body politick, muſt, one would think, be a great confinement and fatigue, and a ſtation not very deſirable; and yet all is diſcharged with the greateſt regularity, chearfulneſs, diligence, conſtancy and delight.

The employment of the commons is to gather wax, (which takes up moſt of the firſt week after the ſwarm) in order to build the combs; to fetch in honey, with neceſſary materials, as proper nutrition for the young; to keep guard, carry forth the dead, kill the drones, and cleanſe the hives, &c.

Then the office of the Drones is either procreation according to ſome, or hatching and haſtening the young brood according to others. Yet theſe are but of ſhort duration, few living above three months, others not more than two, and many not one. And the nymphs often dragged out of the cells before they are perfect, and caſt out of the hive.

CHAP. VIII.

Of the Bees Enemies.

WHAT pity it is that creatures, of ſo great excellency and uſefulneſs to mankind, ſhould have any enemies; but certain it is they have many. The chief of which are as follow.

Some of their worſt enemies we have conſidered in the preceding chapter, even thoſe of their own ſpecies, none being more hurtful to them, except their cruel and mercileſs owners, who at once depopulate and utterly deſtroy, without the leaſt compaſſion, whole kingdoms and empires. Both rich and poor ſtocks are here equally guilty, and try to augment their own ſtore, tho' with the greateſt difficulty, danger, and diſhoneſty. Where they meet with little or no oppoſition, they grow bold and impudent, but a reſolute and vigorous reſiſtance makes them retire.

But if once thro' their numbers they ſtorm the citadel, and the garriſon is forced to yield (their chief deſign being to rob from others, and enrich themſelves) they immediately fall to plundering the city, and tranſport the treaſure into their own dominions; when the true Bees are left inevitably to die thro' famine, which is far worſe than ſudden death.

Sometimes it is not only a ſingle ſtock that is thus employed, but ſeveral are in arms at once, and not eaſily compoſed. I have before directed how to prevent this miſchief.

Another enemy is the mouſe, eſpecially the field-mouſe. Theſe are dangerous, and deſtroy multitudes every winter in our kingdom; therefore carefully guard againſt them. I once loſt a ſtock by this means, and only that once; they had made a neſt among the combs, and bred young.

Keep the door therefore ſo cloſe that a mouſe cannot enter, and examine the hackle, to diſlodge them from thence. An effectual preſervative would be to place your hives ſo, that it may be impoſſible for a mouſe to aſcend; as many of mine are. Alſo place traps in your Bee-garden. I caught no leſs than thirty mice in one garden the laſt winter. And the ſame number of titmice.

The titmouſe is a great devourer of Bees, ten or twelve being ſcarce ſufficient for his breakfaſt, often returning for a freſh feaſt. Tearing the Bee to pieces, he eats the entrails, and drops the reſt.

Frequently have I found him knocking at the door, when no ſooner doth the poor innocent Bee appear to enquire what gave the alarm, but ſhe is ſeized, and becomes his prey. The ſame enemy often ſeizes them when abroad. Shoot them, or ſet traps for them.

The houſe-lark, a little dun bird with a black bill, in ſummer time is the death of many Bees; ſhe watches near the hives or colonies, ſeizing them as they ſettle, and many times in flight, and carries them to her young. This bird builds her neſt in the wall of an houſe, where I have often found it, and deſtroyed ~~bold~~ both old and young together.

The ſwallow likewiſe feeds her young with Bees, as I have found by diſſection; if poſſible deſtroy their neſts.

The ſparrows do them little or no prejudice, only feeding themſelves or their young, with the white maggots, or the unripe nymphs caſt out of the hive.

The moth is not the leaſt enemies to Bees, concealing herſelf, ſhe lays her eggs, which by the heat in the hive turn to worms or maggots, ſecreted at firſt in the ſkirts of the hive (which ought to be ſtopped with lime and hair) but afterwards getting into the combs, generally prove the ruin and deſtruction of the whole; for the Bees, not able to endure ſuch diſagreeable company, abandon their habitation, leaving the enemy in full poſſeſſion. Deſtroy them if you can.

The ſpiders alſo deſtroy many, catching them in their nets at their return home, being heavy loaden. They ſpread their nets about the hives, or colonies within the Bee-houſe, round the boxes, upon the walls, flowers or buſhes, wherein the Bees are immediately entangled and killed. To preſerve your Bees, diſpatch the ſpiders, and break down their fatal and enſnaring nets.

Waſps are ſome of their worſt enemies, by which many hives are entirely deſtroyed. They begin firſt with the dead Bees upon the ground, pulling them to pieces, and carrying them to their neſts. Afterwards they grow more bold and impudent, and paſſing the guard, they adventure into the hive, where ſometimes the Bees ſeizing them, puniſh them with death, and directly bury them.

Waſps by nature are ſtronger than Bees, and better able to endure hardſhip; and when the cold weather comes, they often deſpoil poor and weak ſtocks. I had one many years ago entirely demoliſhed, being at a diſtance, and not under my own inſpection.

In ſpring deſtroy to your power the great waſps at their firſt appearance. You will find them upon the gooſeberries and currants when they bloſſom; here I have often caught and killed them. And by killing one of theſe you deſtroy a whole neſt at once.

Once moving a Bee-ſtone in my garden, which had lain ſome time upon the ground, one of theſe waſps immediately took wing, and ſaved herſelf by flight.

Upon a very ſtrict ſurvey of the place, I eſpied a comb newly begun, in which there was five cells of an unequal depth, and in three of them there was young brood; and the other two were empty.

Every one of theſe waſps ſingly and alone, without any ſecond, makes a neſt. Spare none of theſe; if you can by any means get them in your power, ſhew them no favour. Afterwards ſearch for their neſts, and when found, burn or ſcald them, which will be a ſignal ſervice to your Bees.

Hornets are alſo enemies, eſpecially where they are numerous, yet not ſo dangerous as waſps. She flies about the colonies or hives, watching her opportunity, then ſeizes a Bee, and carries her away, as the hawk does the little bird.

It is two or three years ſince I found a neſt of hornets, under the eves of a ſummer-houſe at the end of my colonies, which I took care to extirpate in time.

Earwigs or emmets are enemies to Bees. The former in the day time conceal themſelves under the hackle, and in the night creep into the hive, and eat the honey. Sometimes I cover the top of the hives with aſhes, to prevent their ſettling there. Let theſe with the other enemies be the objects of your reſentment.

Again : tempeſtuous weather, with froſt and ſnow, is often fatal to Bees. When the ground is covered with ſnow, ſuffer not your Bees to come abroad, tho' the ſhining ſun may invite and tempt them. The ſnow dazzles their eyes, amazes and confounds them ſo far, that they fall into it, and die preſently. And ſtormy weather, with rain and hail, kills many, when they are out at labour.

The better to ſecure your Bees againſt bad weather, ſhelter your apiaries as well as you can from the eaſt and north winds. Let them be alſo well fenced, that neither cattle nor fowl may hurt them.

If you at times find any chilled with cold, and dying, you may recover them with heat, as I have often done with delight, by putting them into an handkerchief, and breathing upon them ; or by carrying them a while in my pocket, and placing them in the ſun-beams, or laying them before the fire. But if their vitals are impaired and hurt, and the animal ſpirits entirely diſſipated, it is impoſſible to recover them.

Snails are doubtleſs an offence to them, and give them ſome trouble and diſturbance, by reaſon of their ſlime and excrements. But whether they are any further detrimental or injurious, is doubtful.

A modern author has told us, a ſnail made bold to ſteal into one of his glaſs-hives. The porters at the lodge gave him but a ſcurvy reception. Their firſt ſalutations, with their ſtings, made him mend his pace. But the ſenſeleſs creature, inſtead of making a retreat, marched forward into the middle of the hive; where a whole band ſet upon him at once, and killed him upon the ſpot. Upon which occaſion there was a council immediately convened. It was beyond their ſtrength to remove the carcaſe; therefore theſe ſhrewd politicians* argued and conſulted the beſt method to prevent any infection ariſing from the putrified carcaſe, to which end they covered it all over with glue.

Here again I am conſtrained to diſagree with the gentleman, and acquaint my readers, that very frequently I have ſeen ſnails within the boxes, and at the back-window, moving about, changing their ſituation, and continuing at times for ſeveral days together; but not ſo much as a ſingle Bee aſſaulting the offenſive animal, or offering the leaſt reſiſtance; but on the contrary, ſhunning, and flying from him.

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* *Nat. Delin.* p. 104.

I have likewiſe oftentimes obſerved them coming out of the colonies, no way hurt or wounded, but in full ſtrength and vigour, at which time I have apprehended many, and deſtroyed them.

Muſt we not then conclude the account given by that author as the production of a very luxuriant fancy, or the effect of great inadvertency?

Once more, what he writes of a grand feſtival on the Queen's progreſs thro' all her dominions, and of forming a large veil, behind which nothing can poſſible be ſeen, and all in honour to her majeſty's proceſſion, paſſes with me more for fancy than matter of fact. But I leave the reader to his liberty.

He alſo tells us of the Bees in *France*, that journey three times a day two leagues from home; nay three leagues for agreeable proviſion. Such ſurely are poſſeſſed of ſome very peculiar excellencies.*

The laſt and worſt enemies of all, are their moſt ungrateful owners, who annually deſtroy them by wholeſale. To prevent this practice to the utmoſt of my power, I refer all my readers to the tenth chapter, which it is hoped will at once ſufficiently direct, and effectually engage them in favour of ſuch innocent, inſtructive, diligent, faithful, and profitable creatures.

Of the Age of Bees.

HERE alſo I find authors divided in their opinions. The life of Drones is ſhort, being executed and caſt out at the Queen's command; but the Queen being loſt, I have known them live all the winter with the common Bees, and not killed with cold, contrary to what authors aſſert.

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* *Nat. Delin.* p. 117.

As to the age of the Honey-Bees it is diſputed. Some take them to be mere annuals; others there are, who tell us they live many years.

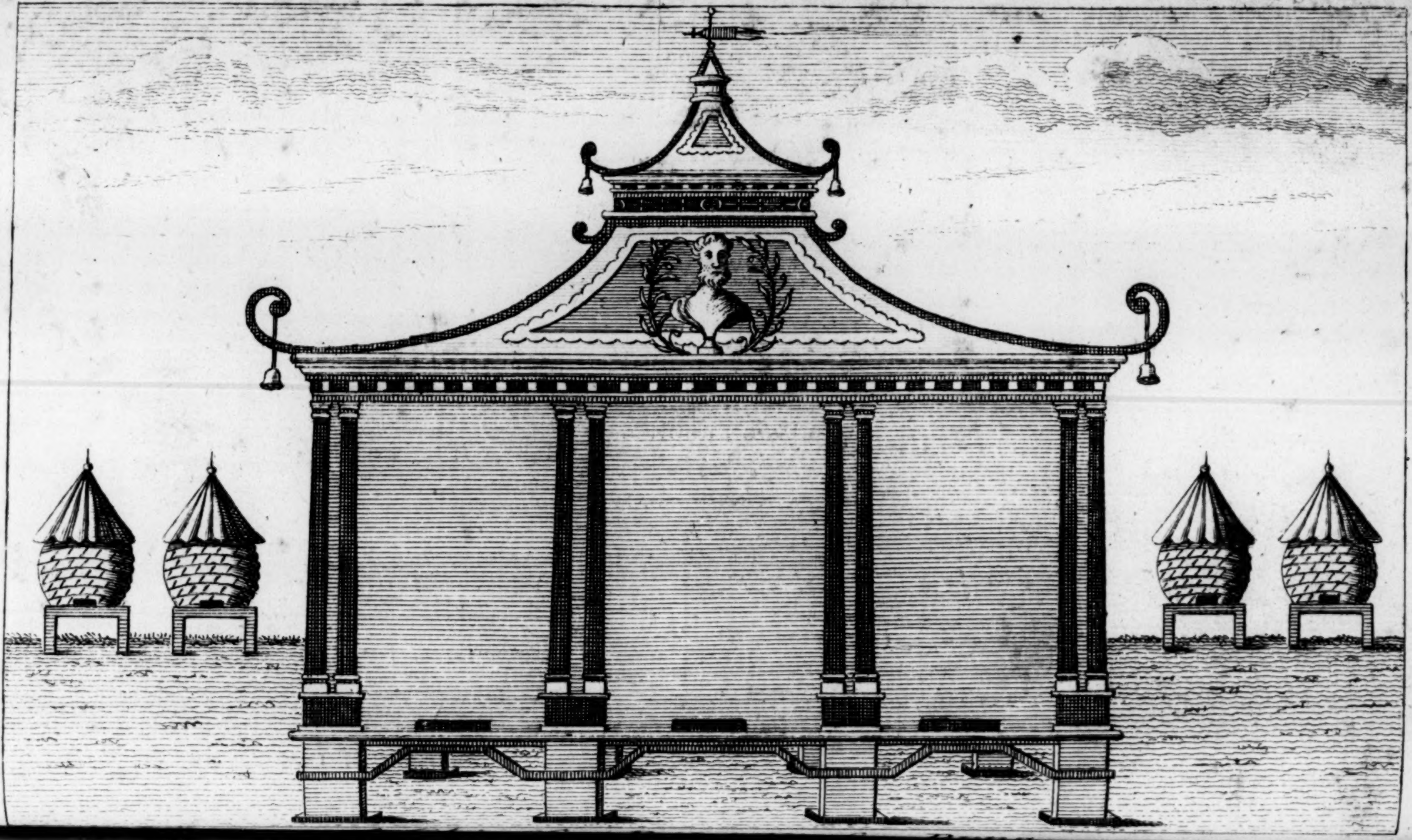
By ſucceſſion it is true they live ſeveral years in hives, as well as colonies; as did the Bees under the leads in *Oxford* over *Ludovives Vives*'s ſtudy, where they continued from 1520 to 1630.

Mr. *Mouffet* ſuppoſes they may live thirty years; and ſays he knew a ſtock that continued in the cieling of the Dutcheſs of *Somerſet*'s houſe more than three decads of years, and queſtions whether they die of age at all.

The *French* author ſays they live ſeven or eight years, and ſometimes longer. By ſucceſſion I have known them live that number of years in hives, and adviſe none to keep them ſo long a time.

Dr. *Butler* affirms it, that a Bee is but a year's bird, with ſome advantage: and others ſay her age is but a year at longeſt. I am well aſſured great numbers of them die annually thro' hard labour. Obſerve with ſome ſtrictneſs an hive of Bees in *July*, and you may perceive many amongſt them of a dark colour, with wings rent and torn, and in *September* not one of them to be ſeen; and it is my opinion that a Bee lives no longer than two ſummers; yet that is a long life, if compared with the waſps, the drones, or the ſilk-worms. Why then ſhould they not be ſuffered to live out all their time?

CHAP.



CHAP. IX.

Directions for the right Management, and beſt Improvement of Bees in Colonies.

MR. *Jeddie* firſt contrived this method, for which he had a patent from King *Charles*. Many more, and much greater are the advantages ariſing from Bees kept in colonies, than can be gained in the common way of hives. For inſtance:

The certain preſervation of ſo many thouſands of theſe noble and uſeful creatures; which ſurely ſhould not be eſteemed the leaſt. Thus you every year reap the delicious fruits of their indefatigable and faithful labours, and yet have all their lives ſecured.

Once I took a box, with every cell in it full of honey, and moſt of all ſealed up; wherein I found only two common Bees, and one Drone.

Another advantage is their ſtrength (which conſiſts in their numbers) and by conſequence their greater ſafety. By this means they are better able to defend themſelves againſt their enemies (the robbers) and preſerve both their lives and fortunes.

Yet I have known (tho' not often) colonies in good ſtate, as well as hives, invaded, but not vanquiſhed. A little aſſiſtance has put them out of danger.

A third advantage ariſing to the owners in this method, is their wealth and riches, by means of their united labours. This neceſſarily turns to the greateſt profit of the proprietor.

I have in ſome ſummers taken two boxes from one colony filled with honey, and yet ſufficient ſtore left in the other two boxes for their maintenance, each box weighing forty pounds; and allowing ten pounds for each box, with the wax, *&c.* there muſt be ſixty pounds of honey for the Bee-maſter; which at 6*d.* a pound is 1*l.* 10*s.* But it really is of more worth, becauſe of the goodneſs and ſuperior excellence of the honey, the far greater part thereof being pure virgin-honey, and perfectly neat and fine.

Beſides all this, the liberty and pleaſure of viewing them and inſpecting them at all ſeaſons, ſummer and winter, even in the buſieſt times of gathering, with the greateſt ſafety.

Neither do they require (as the hives) a conſtant attendance in ſwarming time.

This method ſo compaſſionate, and yet ſo uſeful, contributing both to profit and pleaſure, muſt appear greatly preferable to the other, and far more eligible.

It might be added, they muſt alſo be effectually ſecured from wet and cold, mice, and other injuries.

The Form of the Boxes, with Directions how to make them.

DEAL, being ſpungy, is moſt proper, and ſucks up the breath of the Bees ſooner than what is more ſolid; yellow, dram-deal is the beſt, thoroughly ſeaſoned.

An octagon, being neareſt to a ſphere, is the beſt form; ſince as the Bees in winter lie in a round body in or near the center of the hive, a due heat is conveyed to all the out-parts, and the honey kept from candying, which in a ſquare would not be ſo effectually prevented, and is many times prejudicial to the Bees, and ſometimes proves their ruin. Thus much for the materials.

The dimenſions of my boxes, and which I would on ſo long a trial recommend to others, are in depth ten inches the inſide, the top-board a full inch; and the breadth within twelve or fourteen inches.

Any gentleman, who chuſes boxes of a larger extent, may order the depth a full foot, and the breadth within ſixteen inches, not forgetting to make the houſe proportionable.

I have tried boxes containing a buſhel and more, but found them not to anſwer the deſign like thoſe of a leſſer ſize. The larger are not ſo eaſily managed; they are much longer in filling; ſo that it is later e'er you come to reap the fruits of their labours; the firſt year you muſt not expect it, perhaps not the ſecond neither, nor will the honey be ſo good and fine.

The beſt and pureſt honey is what is gathered the firſt five or ſix weeks, which is worth 1*s*. a pound. And in boxes of leſs dimenſions, (planted as hereafter directed) provided the ſeaſon be at all favourable, you may take in a month, or little more, a box full of the fineſt honey; and in an extraordinary ſeaſon the ſame colony will ſpare you two boxes, reſerving what will be ſufficient for their own ſupport.

For the top of the box, an entire board would be beſt, or elſe two boards very firmly glued together, and a full inch thick when planed, and at leaſt an inch more in breadth than the dimenſion of the box, which, in the management of the colonies, you will find to be an advantage; the edges underneath may have a little mould, merely for ornament's ſake.

In the middle hereof muſt be an hole five inches ſquare, for a communication between the boxes, covered with a ſliding ſhutter (of deal or elm) running eaſily in a groove, over the back-window. The eight pannels or ſquares nine inches deep (and three parts of an inch thick when planed) are to be let into the top ſo far, as to keep them in their proper place; ſecured at each corner with plates of braſs, and at the bottoms cramped with wires to keep them firm; ſince the heat in ſummer will try their ſtrength.

A glaſs window behind, fixed in a frame, with a thin deal cover, two ſmall braſs hinges, and a button to faſten it. Here you may inſpect into your colonies and ſee their ſtate, employment, proſperity and improvements, with pleaſure and ſafety, at any ſeaſon.

Front doors to your colonies, and two glaſſes to one box, I am ſenſible are of ſo little ſervice, and attended with ſo many inconveniencies, that I utterly diſlike them, and never uſe more than one, which I find well enough anſwers the deſign. Thoſe who are otherwiſe minded may have more.

Two braſs handles, on each ſide one, are neceſſary to lift up the box or boxes, fixed in with two thin plates of iron, near three inches long, to turn up and down within the box, and put in three inches beneath the top-board, which is nailed cloſe down with ſprigs to the other parts of the box.

Thoſe who chuſe a frame within, to which the Bees may faſten their combs, need only uſe a couple of deal ſticks of an inch ſquare, placed acroſs in the box, and ſupported by two pins of braſs, one an inch and half below the top, the other two inches below it, by which means the combs will quickly find a reſt. But if at the firſt plantation an hive is put into the houſe, together with a box, there will be no occaſion for ſuch ſupports.

One thing yet is wanting to perfect the work, *viz.* a paſſage for the Bees to go in and out four or five inches in length, but in depth leſs than half an inch. Now we are in readineſs for an houſe.

A Deſcription of the Bee-Houſe, for ſix Colonies.

IN keeping Bees in colonies, an houſe is neceſſary, or at leaſt a ſhed; without which the weather, eſpecially the heat of the ſun, would ſoon rend the boxes to pieces.

Your houſe may be made of any boards you pleaſe, but deal is the beſt; let the materials be of what ſort you pleaſe, the houſe muſt be painted, to ſecure it from the weather.

The form and dimenſions of the houſe are theſe; the length thereof full twelve feet and an half. Each colony ſhould ſtand a foot diſtant from the other.

The height three feet and an half, to admit four boxes together. If only three boxes be employed, two feet eight inches.

The breadth two feet on the inſide. The four corner poſts to be made of oak, and well fixed in the ground, that no ſtormy winds may overturn it, and all the rails of oak, ſupported by ſeveral uprights of the ſame, before and behind, that they may not yield or ſink under 6, 7, or 800 weight or upwards. The floor of the houſe (about two feet from the ground) ſhould be ſtrong and ſmooth, that the loweſt box may ſtand cloſe to it.

This floor may be made with boards or planks of deal the full length of the Bee-houſe; or, which I prefer, with a board or plank to each colony, of two feet four inches long, and fixed down to the rails; and that part which appears at the front of the houſe may be cut into a ſemicircle as a proper lighting place for the Bees, which plane down, that the wet may fall off. When this floor to a ſingle colony wants to be repaired, it may with eaſe be removed, and another placed in it's room, without diſturbing the other colonies, or touching any other part of the floor.

The interſpaces may be filled with other pieces of boards, or planks of an equal thickneſs, which will laſt for many years. I only propoſe this, leaving the reader to his choice.

Upon this floor, at equal diſtances, all your colonies muſt be placed, againſt a door or paſſage cut in the front of the houſe.

Only obſerve further, to prevent any falſe ſtep, that as the top-board of the box (being a full inch broader than the other part) will not permit the two mouths to come cloſe together, you muſt cut a third in a piece of deal of a ſufficient breadth, and place it between the other two, ſo cloſe, that not a Bee may get that way into the houſe. And fixing the ſaid piece of deal down to the floor with two lath-nails, you will find afterwards to be of ſervice, when you have occaſion either to raiſe a colony, or take a box of honey, and may prove a means of preventing a great deal of trouble and miſchief.

The houſe in this forwardneſs, you may cover it to your own mind, with boards, fine ſlates, or tiles. But contrive their poſition ſo as to carry off the wet, and keep out the cold, rain, ſnow, or whatever might any way prejudice and hurt them.

The back-doors may be made of half-inch deal, two of them to ſhut cloſe in a rabet, cut in an upright pillar, which may be ſo contrived, as to take in and out, by a mortiſe in the bottom rail, and a notch in the inſide of the upper rail, and faſtened with a ſtrong haſp. Place thoſe pillars in the ſpaces between the colonies.

Concluding your houſe made after this model, without front-doors, a weather-board will be very neceſſary to carry the water off from the places where they ſettle and reſt.

Good painting will be a great preſervative. Forget not to paint the mouths of your colonies, with different colours, as red, white, blew, yellow, &c. in form of a half moon or ſquare, that the Bees may the better know their own home. Such diverſity will be a direction.

Thus your Bees are kept warm in the coldeſt winter, and in the hotteſt ſummer greatly refreſhed by the cool air, the back-doors being ſet open without air-holes made in the boxes.

How to furniſh the Colonies with Inhabitants.

An Houſe thus fitted up, the next thing is to furniſh it with inhabitants. The beſt time to plant your new colonies, is either the ſpring (*March* or *April*) or in ſummer (*May* or *June*) according as you determine to begin with a ſtock of Bees, or with ſwarms.

If the firſt, let it be a new ſtock (a laſt year's ſwarm) rich in honey, and full of Bees. No other are fit for a colony. Poor and weak ſtocks will but diſappoint you.

But if you chuſe the latter, (which I ſhould rather recommend) procure two ſwarms, if poſſible, the ſame day, and put them together into two boxes, or an hive with a box, and at night place them in your houſe, and with a knife, and a little lime and hair, ſtop cloſe the mouth of the hive, or upper box, that a Bee may not be able to go in or out, but at the front door, which is to be their only and their conſtant paſſage.

If you occupy none but boxes, you will in a week or ten days time, with pleaſure, ſee the combs appear, and filling with honey; but if it be an hive you will ſee nothing till they have wrought down into the box.

I never employed an hive in this method but once, which proved ſo diſagreeable, and ſo difficult to remove, that I have ever ſince uſed boxes only.

Never plant a colony with a ſingle ſwarm, as I have ſometimes done, but with little ſucceſs. But your united ſwarms will yield you a box of the pureſt honey at the end of *June*, or beginning of *July*, which makes a very great difference. Here is both profit and pleaſure, with a quick return.

When the ſecond box, or the box under the hive, appears full of Bees and combs, it is a proper time to raiſe your colony in the duſk of the evening, when all the Bees are at home, in manner following.

Place your empty box, with the ſliding ſhutter drawn back, behind your houſe, near the colony to be raiſed, and near the heighth of the floor, by the help of another empty box upon the ground; then lifting up the colony with what expedition you can, ſet it down upon the empty box, with the mouth of the colony cloſe to the piece of wood nailed upon it (as before directed) that not a Bee may get out thereat.

This done (immediately with or without any aſſiſtant) lift the hive and two boxes, or the three boxes, into the houſe again, putting them in their proper place. If afraid, you may make uſe of a thin veil during the operation.

Directions how to take the Straw-Hive or Box.

WHEN by the help of the back-windows, you find a ſufficient quantity of honey, and ſealed in the middle box, and the loweſt box half full of combs, alſo few Bees in the uppermoſt box, proceed thus.

At or about five o'clock in the afternoon, drive cloſe the ſliding ſhutter, under the hive or box, to be taken from the colony, with a mallet. If the combs are new, you may force the ſhutter home without that inſtrument, with your hand; be ſure it be cloſe, that no Bees may aſcend into the hive or box to be removed.

After this, ſhut cloſe the doors of your houſe, and leave the Bees thus cut off from the reſt of their companions for the ſpace of half an hour, or more. In this ſpace of time, having loſt their Queen, and other company, they will fill themſelves with honey, and be impatient to be ſet at liberty. Then opening the back-window, you will ſee them in the greateſt hurry and tumult, running up and down, attempting one way or other to diſengage themſelves from ſo diſagreeable an impriſonment.

If in this interim you examine the box or boxes beneath, and obſerve all compoſed and quiet there, then you may be confident you are ſo far right, and the Queen is in ſafety. Hereon raiſe the back part of the hive, or box, ſo far, by a piece of wood, or other material thruſt underneath, as may give the priſoners room to come forth; who taking wing will return to their fellows; delightful to behold! then lifting the box from off the colony, turning the bottom upwards, cover it with a cloth all night; and if any Bees be left in it, let them out the next day, and they will return to the colony.

Thus have you an hive or box of honey, and all your Bees ſaved; which will recompenſe you by their future faithful labours.

Provided it is an hive which you take, and with any conſiderable number of Bees in it, you may drive them out into an empty hive, as ſome writers have directed.

Placing an empty hive in a bucket, with the mouth upwards, lift the hive from the colony upon the other, tying a cloth preſently about them, turning the bottom hive to the top, which done you may carry them to ſome diſtance, and with a ſtick ſtrike ſmartly all round the bottom hive, diſturbing the Bees in it, ſtopping at times, to give them liberty to aſcend. Be ſure not to ſhake the upper hive, during the operation, but keep it firm and ſteady in it's place. When you perceive by the noiſe of the Bees, they are got up, carry the hive, and knock the Bees out on the ground, or upon a cloth ſpread upon it, with one end faſtened to the lighting board, when they will go to the colony.

But as I never place a ſtraw-hive in a houſe or colony, I have no ſuch trouble to come at their treaſure. Never raiſe a colony after the tenth of *July*, and take away the loweſt box, if it is not at leaſt half filled with combs.

CHAP. X.

Containing full and plain Directions, how to preſerve the Lives of thoſe moſt valuable Inſects, when you become Maſters of their Treaſure.

THE preſervation and improvement of Bees in colonies, has been no ſecret, ſince Mr. *Jeddie*'s happy invention. And how effectually to promote the ſaid ends in the way of common hives is the deſign of this chapter.

From the long obſervation I have made of theſe very wonderful creatures, and their inimitable excellencies, together with their great uſefulneſs to mankind, I am become one of their greateſt admirers, and a publick advocate for them. Moſt ſolemnly proteſting againſt all that notorious ingratitude of their cruel owners, who not content with all their treaſure (collected with infinite pains, and many perils) devote them to deſtruction without any diſtinction, to their own great loſs.

Is no regard due to theſe creatures of God, which are ſo excellent in themſelves, and ſerviceable to men? when the following pages will make it appear, with how little trouble, and without any expence, the owners may come at their riches, with ſafety to their lives; thoſe who ſhall hereafter doom them to the common death, muſt be altogether without excuſe.

The method I have purſued with ſo great ſucceſs for many years, and now recommend to the public as moſt effectual for preſerving Bees in common hives, is incorporation, or uniting two ſtocks into one, by the help of a peculiar fume, or opiate, which for a time will put them entirely in your power to divide and diſpoſe of at your pleaſure. Yet know that dominion over them will be but of ſhort duration, therefore you muſt be expeditious in the operation.

You muſt know the Queen or commanding Bee perfectly well, which you are immediately to ſearch for among the multitude, to apprehend and impriſon, returning her no more to her beloved and moſt loyal ſubjects. Search among the Bees which you deſtroy by brimſtone, whereby you may learn to know her.

No new ſwarms or ſtocks ſhould be thus united, except very late ones, and caſts, which have not gained a ſufficient quantity of honey for their winter ſtore. Such I always unite, to ſave their lives.

Hives or ſtocks, which have ſwarmed once or twice, conſequently reduced in their numbers, are the fitteſt to be joined together, which will greatly ſtrengthen and improve them.

Nevertheleſs, if you have a ſtock both rich in honey, and full of Bees, which you are deſirous to take, it is but dividing the Bees into two parts, and put them into two other hives, inſtead of one.

I muſt add one precaution more under this head, *i. e.* examine firſt that ſtock, to which you deſign to join the Bees of another, whether there is honey enough in it, to maintain the Bees of both; it ſhould be full twenty pounds in weight, the heavier the better.

Of the Materials, or Manner of Operation.

I am now to inform my readers what the materials are, and after that the manner of operation.

The narcotic, or ſtupifying fume, is the *Fungus maximus*,* or larger muſhroom, commonly known by the name of bunt, puckfiſt, or frogcheeſe; it is as large or larger than a man's head. I had one of theſe brought me the laſt ſummer (unripe and white) which weighed ſome pounds; but when ripe, of a brown colour, and turning to powder; they are exceeding light.

Shepherds and herdſmen, &c. frequently find them in the fields, and will ſupply you with them, towards the latter end of the ſeaſon.

When you have procured one of theſe pucks, put it into a large paper, preſſing it down therein to two thirds, or near half the bulk, tying it up very cloſe. Put it into an oven ſome time after the houſhold bread is drawn, letting it continue all night. When it will hold fire, it is fit for your uſe in the method following.

With a pair of ſciſſars cut a piece of the puck as large as an hen's egg (better at firſt to have too much than too little) and fix it to the end of a ſmall ſtick, ſlit for that purpoſe, and ſharpened at the other end, which place ſo, that it may hang near the middle of an empty hive. This hive you muſt ſet with the mouth upwards, near the ſtock you intend to take, in a pail or bucket.

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* *Fungus pulverulentus.*

This done, ſet fire to the puck with a candle, and immediately place the ſtock of Bees over it, tying a cloth round the hives (which you muſt have in readineſs) that no ſmoak may come forth. In a minute's time or little more, you will with delight hear them drop like hail into the empty hive. When the major part of them are down, and you hear very few fall, you may beat the top of the hive gently with your hand, to get as many out as you can. Then loſing the cloth, lift it off to a table, or broad board, prepared on purpoſe, and knocking the hive againſt it ſeveral times, many more will tumble out, perhaps the Queen among them, as I have often found lodging near the crown. She often falls one of the laſt.

If ſhe is not there, then ſeach for her among the main body in the empty hive, putting them forth upon the table, if you diſcover her not before.

During this ſearch, you muſt proceed after the ſame manner with the other hive, with which theſe are to be united. No ſooner are thoſe Bees compoſed and quiet, and you have found and ſecured the Queen, but you muſt put the Bees of both hives, together in one, mingling them thoroughly together, and ſprinkling them at the ſame time, with a little ale and ſugar, putting them among the combs of the latter hive, and ſhake them down in it. When they are all in, cover it with a cloth, bound cloſe about it, and let them ſtand all that night, and the next day ſhut up, that a Bee may not get out. Some time after you will be ſenſible they are awaked out of ſleep. The ſame night would be beſt to put them in their proper place, and if you had another garden, wherein to fix them, I would recommend it.

The ſecond night after the union, in the duſk of the evening, looſing the ſtring, move the cloth from the mouth, (taking care of yourſelf) and they will with a great noiſe immediately ſally forth; but being too late to take wing, will go in again: then putting in two pieces of tobacco-pipes, to let in air, ſtop them cloſe in as before, and keep them ſo for three or four days longer; after which you may leave the door continually open.

But in taking away the cloth you muſt uſe diſcretion and caution, ſince they will for ſome time reſent the affront and offenſive treatment.

The beſt time of the year for union is after the young brood are all out, and before they begin to lodge in the empty cells, which they do in great numbers in cold weather and winter-time, tho' Mr. *Ruſden* denies it. *

As to the hour of the day I would adviſe young practitioners to do it early in the afternoon, that having the greater light, they may the better find out the Queen. The few Bees left in the hive ſuffocate with ſulphur. I never knew ſuch combined ſtocks conquered by robbers, and they will either ſwarm the next ſummer, or yield you an hive full of honey. A little practice will make you perfect.

As one view of ſuch an operation would form a more perfect idea of the whole tranſaction, that what the ableſt pen poſſibly can; if any gentleman, or others, are deſirous to ſee the performance, the publiſher freely offers ſers that, or any other ſervice in his power, in which he can oblige them.

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* *Ruſden's Diſcov.* p. 53.

If the directions contained in this hiſtory are diligently and conſtantly obſerved, I durſt almoſt engage for the proſperity of your Bees, whether in colonies, or common hives.

How to make Mead, not inferior to the beſt of Foreign Wines.

Put three pounds of the fineſt honey to one gallon of water, two lemon peels to each gallon; boil it half an hour (well ſcummed) then put in, while boiling, lemon peel. Work it with yeaſt, then put it in your veſſel with the peel, to ſtand five or ſix months, and bottle it off for your uſe.

N. B. If you chuſe to keep it ſeveral years, put four pounds to a gallon.

POSTSCRIPT.

PErſons who chuſe to keep Bees in glaſs hives muſt get a ſwarm in *May*, or at the lateſt, the middle of *June*; hive them in the evening in a box or flat-top'd ſtraw hive, place them where you intend to keep them, then uncover the hole at the top, and place the glaſs over it; ſee that it fit ſo cloſe that no Bees can come out but at the bottom of the hive or box; the Bees will ſoon begin their work in it, the glaſs muſt be covered with an empty hive or cloth, that too much light may not prevent their working. In a good ſeaſon I have had a glaſs filled in thirty days, containing thirty-eight pounds of fine honey. When your glaſs is compleatly filled, ſlide a tin-plate between the glaſs and the box ſo as to cover the paſſage, and in half an hour you may take off the glaſs with ſafety. What few Bees remain will readily go to their companions. Any Gentleman or Lady whoſe curioſity may incline them to ſee the method of managing Bees, may inſpect Mr. *N. Thorley*'s apiary, any Thurſday or Saturday in the afternoon, at Ball's pond, near Newington-green turnpike, where, and at his ſhop, No. 85, in Lombard-ſtreet, near the Manſion-houſe, London, may be had all ſorts of hives, in glaſs, wood, or ſtraw, ready for uſe, and all ſorts of Engliſh and Foreign honey.

THE

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Place the plate of a Glaſs-hive before the title, and the plate of a Bee-houſe before page 139.

THE END.